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TRADE MARK REG. U. S. PAT. OFF.

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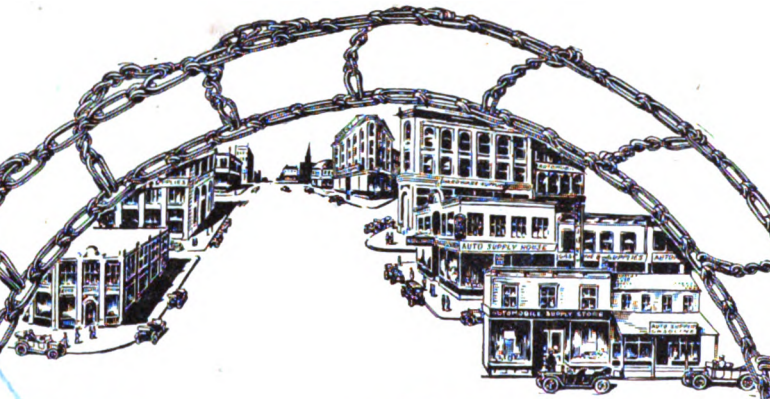

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Complete Index, Pages 8-26
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INDEX TO ADVERTISERS

A

PAGE

Acme Universal Joint Mfg. Co. 225
Adams, William C. 495
Adams & Westlake Co. 209
Advance Mfg. Co. 467
Aetna Motor Truck Co. 43
Ahlberg Bearing Co. 77
Albaugh-Dover Co. 307
Alert Tool Co. 551
Allen Auto Specialty Co. 207
Allen Mfg. Co., W. D. 467
Almond Mfg. Co., T. R. 427
Aluminum Castings Co. 99
American Asbestos Co. 355
American Ball-Bearing Co. 285
American Brass & Iron Co. 83
American Bronze Co. . Opposite Inside Front Cover
American Car & Ship Hardware Mfg. Co. 249
American Developing & Sales Co. 535
American Die Casting Co. 505
American Die & Tool Co. 189
American Electric Air Pump Co. 529
American Gas Furnace Co. 491
American High Speed Chain Co. 229
American Metal Treatment Co. 519
American Motor Utilities Co. 375
American Steel & Wire Co. 451
American Tap & Die Co. 547
American Tool & Machine Co. 515
American Top Co. 417
American Tube Bending Co. 253
American Veneer Co. 151
American Vulcanized Fibre Co. 165
Anderson Electric Car Co. 153
Anderson Forge & Machine Co. 169
Anderson Spark Plug Co. 301
Arlington Co. 259
Armitage Leather Co. 235
Armstrong Bros. Tool Co. 501
Arnold, N. B. 129
Asbestos & Rubber Works of America. 57
Asbestos & Rubber Works of New Jersey
Opposite Inside Back Cover
Ashland Mfg. Co. 223
Ashley Machine Works. 247
Ashton Valve Co. 499
Atkinson Co. 315
Atlas Auto Supply Co. 131
Atlas Drop Forge Co. 463
Atlas Mfg. Co. 145
Attwood Brass Works. 209
Auburn Ball Bearing Co. 423
Auburn Ignition Mfg. Co. 287
Auto Body Co. 73
Auto City Bow Co. 521
Auto Crankshaft Co. 147
Auto Protector Co. 83
Auto Specialties Mfg. Co. 347
Auto Wheel Co. 525
Auto. & Accessories Mfg. Co. 335
Automatic Appliance Co. 379
Automobile Blue Book Publishing Co. 541
Automobile Construction & Engineering Co. 335
Automobile Trade Directory...127, 141, 537 and 596

B

PAGE

B. & L. Auto Lamp Co. 205
B & R Shock Absorber Co. 353
Babson-Dow Mfg. Co. 343
Bachem, Max 447
Backus Novelty Co. 243
Baker & Co. 461
Baldwin Chain & Mfg. Co. 241
Ball & Roller Bearing Co. 423
Barber Mfg. Co. 393
Barcalo Mfg. Co. 555
Barnes Co., Wallace. 397
Barnett Drop Forging Co. 173
Barth Mfg. Co. 223
Barthel & Daly 61
Bell Pump Co. 475
Benford Mfg. Co. 303
Bimel Spoke & Auto Wheel Co. 447
Birkenstein & Sons, S. 417
Bishop Gutta-Percha Co. 451
Blaich, Alfred O. 469
Bliss-Chester Co. 403
Blount Co., J. G. 495
Bock Bearing Co. 77
Booth, N. E. 441
Borne, Scrymser Co. 271
Bossert Co. 217
Boston Auto Gage Co. 175
Boston Gear Works. 313
Boston Insulated Wire & Cable Co. 483
Bowen Mfg. Co. 149
Bower Roller Bearing Co. 89
Brandenburg & Co. 243
Brawley, T. R. 493
Breaznell, J. H. 137
Bresler-Wallace Sales Co. 329
Bretz Co., J. S. 483
Bridgeport Brass Co. 319
Bridgeport Coach Lace Co. 351
Briggs-Detroiter Co. 193
Briscoe Motor Co. 193
Brown-Lipe-Chapin Gear Co. 507
Brunner Mfg. Co. 531
Bunting Brass & Bronze Co. 345
Burd High Compression Ring Co. 459
Burns & Bassick Co. 275
Bush Mfg. Co. 363

C

Cady Patent Appliance Co. 223
Candler Radiator Co. 327
Canton Drop Forging & Mfg. Co. 417
Canton Foundry & Machine Co. 473
Carr Co., F. S. 121
Casey Mfg. Co. 275
Catelain, A. 467
Century Electric Car Co. 153
Century Rubber Co. 407
Champion Machine & Forging Co. 137
Champion Spark Plug Co. .....293, 294, 295 and 296

Digitized by Google

PAGE

Chandler Motor Car Co. 193
Chase & Co., L. C. 123
Chase Motor Truck Co. 41
Chester Demountable Rim Co. 391
Chicago Screw Co. .... 227 and 343
Cincinnati Ball Crank Co. 137
Cincinnati Oil Works Co. 417
Cincinnati Rubber Mfg. Co. 139
Clark Bros. Bolt Co. 79
Class Journal Co.
132A, 132B, 132C, 132D, 531, 530 and 549
Cleveland Ball Bearing Co. 79
Cleveland-Canton Spring Co. 397
Cole Motor Car Co. 197
Columbus Varnish Co. 281
Commerce Motor Car Co. 45
Commercial Research Co. 461
Commercial Vehicle Co. .... 533 and 543
Connecticut Shock Absorber Co. .... 396A and 396B
Connecticut Telephone & Electric Co. .. 396A and 396B
Consolidated Press & Tool Co. 527
Continental Fibre Co. 127
Continental Motor Mfg. Co. 261
Corbin Cabinet Lock Co. 243
Cotta Transmission Co. 187
Courtney, W. J. 425
Covert Motor Vehicle Co. 591
Cowles & Co., C. 463
Cox Brass Mfg. Co. 511
Cramp & Sons Ship & Engine Building Co., Wm. 257
Crandal, Stone & Co. 365
Crane Co., Wm. M. 501
Crescent Tool Co. 503
Crosby Co. 539
Cross Gear & Engine Co. 307
Crowe Name Plate & Engraving Co. 291
Crowley Co., John A. 387
Crown Commercial Car Co. 43
Cullman Wheel Co. 181
Culver-Stearns Mfg. Co. 139
Cutler-Hammer Mfg. Co. 185
Cutter, Geo. A. 551

D

Dann Oil-Cushion Spring Insert Co. 369
Davis Mfg. Co. 401
Davis Mfg. Co., D. L. 317
Dayton Rubber Mfg. Co. 407
Denby Motor Truck Co. 39
Detroit Auto Dash Co. 151
Detroit Gear & Machine Co. 187
Detroit Leather Works 69
Detroit Lubricator Co. 245
Detroit Pressed Steel Co. 219
Detroit Screw Works 341
Detroit Seamless Steel Tubes Co. 427
Detroit Steel Products Co. 445
Detroit Twist Drill Co. 481
Detroit Wire Spring Co. 369
Dewey-Anderson Mfg. Co. 317
Diamond State Fibre Co. 165
Diehl Mfg. Co. 157
Dixon Crucible Co., Joseph 191
Doehler Die-Casting Co. 107
Donnelly Motor Equipment Co. 371
Dorl-Wiley Co. 415
Douglas & Lomason Co. 205
Dover Stamping & Mfg. Co. 97
Dreadnaught Tire & Rubber Co. 411
Driggs-Seabury Ordnance Corp. 527
Durant-Dort Carriage Co. 309
Durkee-Atwood Co. 129
Dyer Apparatus Co. 511
Dyneto Electric Co. 377

E

Eagle Oil & Supply Co. 273
Eastern Hard Fibre Co. 165
Eastman & Gale 105
Eccles Co., Richard 463

PAGE

Eclipse Mfg. Co. 151
Eco Mfg. Co. 335
Edison Storage Battery Co. 59
Edmunds & Jones Mfg. Co. 229
Egry Register Co. 535
Eisemann Magneto Co. 251
Electric Auto-Lite Co. 159
Electric Smelting & Aluminum Co. 503
Electric Welding Products Co. 592
Elk Mfg. Co. 403
Empire Automobile Co. 305
Empire Axle Co. 291
Erie-Buffalo Tube Co. 425
Eureka Co. 255
Eveready Storage Battery Works of National Carbon Co. 419

F

F. & H. Wire Wheel Co. 449
Fahrig Metal Co. 475
Farmer Mfg. Co. 311
Faw, J. H. 281
Fedders Mfg. Co. .... 324 and 325
Federal Miniature Lamp Division, National Lamp Works of General Electric Co. 233
Federal Pressed Steel Co. 291
Feicht-Bevington Mfg. Co. 503
Fermoile-Johnson Storage Battery Co. 73
Field & Co. 489
Findeisen & Kropf Mfg. Co. 95
Fischer Co., C. J. 32
Fisher Electrical Works 347
Fitzgerald Mfg. Co. 213
Flentje, Ernst 489
Flexible Valve Remover Co. 465
Forest City Electric Co. 371
Fox & Co., Samuel 387
Franklin Mfg. Co. 109
Frasse & Co., Peter A. 219
Frontier Specialty Co. 303
Frost Gear & Forge Co. 167
Funke Co., Herbert F. L. 307

G

Ganschow Co., Wm. 469
Garage Equipment Mfg. Co. 87
Gaulois Tire Corp. 411
Gemmer Mfg. Co. 594
General Aluminum & Brass Mfg. Co. .... 105 and 253
General Asbestos & Rubber Co. 55
General Drop Forge Co. 273
Genter Co., J. H. 281
Germann Bronze Co. 489
Gibson Co., Wm. D. 471
Gill & Sons Forge & Machine Works, P. H. 429
Gilmer Co., L. H. 65
Globe Machine & Stamping Co. 81
Globe Malleable Iron & Steel Co. 113
Glover Equipment Co. 415
Gould Storage Battery Co. 59
Grady Mfg. Co. 307
Graham & Co., James 201
Grand Rapids Show Case Co. 351
Grant-Lees Gear Co. 189
Grant Mfg. & Machine Co. 517
Graton & Knight Mfg. Co. 67
Gray & Davis 231
Gurney Ball Bearing Co. 423

H

H. P. L. Washer & Safety Bolt Mfg. Co. 269
Haartz, J. C. 237
Hale Electric & Engineering Co. 459
Hamilton Rubber Mfg. Co. 425
Hammett Co., J. L. 459
Hanline Bros. 279
Hanson-Ward Veneer Co. 151
Hardy Mfg. Co. 163

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PAGE

Harley Co. 105
Harris, Chas. H. 189
Harris Bros. Co. 485
Harrison Mfg. Co. 521
Hartford Machine Screw Co. 297
Hartford Suspension Co. 353
Harvey Co., Arthur C. 387
Harvey Spring Co. 369
Haws, George A. 273
Haynes Automobile Co. 125
Healy Tool & Appliance Co. 521
Heinze Electric Co. 499
Heithecker, A. 509
Herschell-Spillman Co. 495
Herz & Co. 303
Hess-Bright Mfg. Co. .... Front Cover
Hess-Pontiac Spring & Axle Co. 393
Hide, Leather & Belting Co. 69
Higgins Spring & Axle Co. 395
Highland Body Mfg. Co. 75
Hodge & Graves Co. 349
Hodgman Rubber Co. 415
Hofacker Mfg. Co. 205
Hood Rubber Co. 411
Hoosier Storage Battery Co. 59
Hopewell Bros. 97
Horat, J. 521
Horton Mfg. Co., F. L. 419
Hoyt Electrical Instrument Works 527
Hoyt Metal Co. 109
Hubbard Spring Co., M. D. 395
Hyatt Roller Bearing Co. 301
Hydraulic Pressed Steel Co. 157

I

Ideal Sheet Metal Works 327
Imperial Automobile Co. 545
Imperial Brass Mfg. Co. 329
Ingalls-Shepard Forging Co. 513
Ingersoll-Rand Co. 529
International Cycle-Car & Accessories Co. 197
Interstate Electric Novelty Co. 347

J

Jackson-Church-Wilcox Co. 443
Jackson Cushion Spring Co. 397
Jackson Motor Shaft Co. 93
Jackson Rim Co. 333
Jacobson Machine Mfg. Co. 483
Jaeger Co., H. J. 233
Janney, Steinmetz & Co. 399
Jeffery Co., Thomas B. 133
Jeffery-DeWitt Co. .... 301 and 315
Jessop & Sons, Wm. 385
Johnson & Co., W. L. 355
Johnston Paint Co., R. F. 165
Jones & Co., Phineas 525
Judd & Leland Mfg. Co. .... 209 and 321

K

K & W Rubber Co. 493
Kalbfleisch Co., Franklin H. 245
Kearney Co., T. F. 237
Kellogg Mfg. Co. 527
Kells Mfg. Co., W. J. 199
Kelly-Springfield Tire Co. 409
Keystone Vehicle Co. 75
Kimball & Co., C. P. 87
King Motor Car Co. 133
Kingsbury-Leahy Co. 75
Kinsler-Bennett Co. 227
Kosmath Co. 41
Koven & Bro., L. O. 399

L

PAGE

Laidlaw Co. 269
Lake Erie Mfg. Co. 487
Lake Sales Co. 349
Laminated Shim Co. 351
Landers Bros. Co. 443
Landis Tool Co. 497
Lane, Will B. 547
Lavigne Gear Co. 313
Leather Tire Goods Co. 57
LeCompte Co. 209
Lee Co., Wm. O. 111
Lewis Electric Welding & Mfg. Co. 501
Lexington Howard Co. 309
Liberty Cut Glass Works 207
Liggett Spring & Axle Co. 135
Light Mfg. & Foundry Co. 103
Limerick Co., J. Arthur 349
Lindenberg Steel Co. 525
Lindholm Metal Stamping Co. 149
Link-Belt Co. 155
Livingston Radiator & Mfg. Co. 327
Lonergan Co., J. E. 459
Long Mfg. Co. 323
Lovell-McConnell Mfg. Co. 213
Lumen Bearing Co. 191
Lyon, Edward F. 259
Lyons Atlas Co. 357

M

McCandless & Co., H. W. 233
McCord Mfg. Co. .... 176 and 177
McDowell Mfg. Co. 427
M. & S. Gear Co. .... Inside Back Cover
Malleable Iron Fittings Co. 477
Manufacturers Foundry Co. 413
Manzel Bros. Co. 317
Marburg Bros. 423
Marko & Co., Paul M. 481
Mather Spring Co. 367
Mattson Rubber Co. 471
Maxwell Motor Co. 197
Metal Hose & Tubing Co. 321
Metal Products Co. 485
Metallic Automobile Matting Co. 259
Metz Co. 305
Michigan Crank Shaft Co. 149
Michigan Electric Welding Co. 593
Michigan Engine Valve Co. 433
Michigan Motor Specialties Co. 139
Michigan Steel Casting Co. 353
Milwaukee Auto Specialty Co. 445
Milwaukee Die Casting Co. 107
Mitchell-Lewis Motor Co. 125
Mogul Metal Co. 109
Moline Automobile Co. 197
Montgomery & Co. 551
Moon Motor Car Co. 133
Morris & Co., E. K. 427
Morrison-Ricker Mfg. Co. 191
Mosler & Co., A. R. 299
Mossberg Co., Frank 553
MotoKart Co. 305
Motometer Co. 399
Motor Car Mfg. Co. 309
Motor World 117
Motor & Accessories Adjustment Co. 127
Mott Wheel Works 359
Motz Tire & Rubber Co. 407
Mound Tool Co. 539
Muncie Foundry & Machine Co. 485
Muskegon Motor Specialties Co. 91
Mutty Co., L. J. 237
Murzzy-Lyon Co. 109

N

N. P. Motor Co. 507
Nairn Linoleum Co. 241
Nathan Novelty Mfg. Co. 347
National-Acme Mfg. Co. 269
Nash Co., George 489
National Electric Welder Co. 501

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PAGE

National Engineering Co. 471
National Lead Co. 215
National Leather Mfg. Co. 69
National Malleable Castings Co. 473
National Rubber Co. 131
National Rubber Filler Co. 131
National Shock Absorber Co. 509
National-Standard Co. 223
National United Service Co. 391
Nemo Chemical & Specialty Mfg. Co. 131
Never-Skid Mfg. Co. 493
New Britain Machine Co. 545
New Departure Mfg. Co. 63
New Haven Carriage Co. 73
New Process Gear Corp. 195
New Standard Foundry Co. 447
New York Gear Works 469
New York Lubricating Oil Co. 275
N. Y. Wire & Spring Co. 395
Newark Stamping Co. 551
Nicholson File Co. 487
North East Electric Co. 531
Northwestern Chemical Co. 129
Northwestern Storage Battery Co. 493
Novelty Leather Works 517
Novelty Tufting Machine Co. 519

O

O'Bannon Corporation 235
O'Brien Mfg. Co., Joseph F. 163
Oakes Co. 163
Oakland Motor Car Co. 37
Obenberger Drop Forge Co. 475
Ohio Forge Co. 463
Ohio Malleable Iron Co. 111
Oldberg Mfg. Co. 267
Osborne & Stephenson Mfg. Co. 321

P

Paige-Detroit Motor Car Co. 547
Parish Mfg. Co. 483
Parish & Bingham Co. 171
Park Drop Forge Co. 145
Parker White Metal & Machine Co. 321
Paterson Co., W. A. 545
Paulson & Son, Thomas 257
Paxson Co., J. W. 517
Pedersen Lubricator Co. 245
Penn Spring Works 454
Pennsylvania Steel Co. 383
Perfection Spring Co. 595
Perkins-Campbell Co. 48
Philadelphia Storage Battery Co. 499
Philadelphia Timer & Machine Co. 489
Phillips Auto Seat Cover Co. 539
Phoenix Die Casting Co. 105
Phosphor Bronze Smelting Co. 471
Pioneer Brass Works 211
Pittsburgh Model Engine Co. 401
Pittsfield Spark Coil Co. 421
Plato Art Co. 259
Platt & Washburn Refining Co. 275
Polo Tire Alarm Co. 363
Porter, H. K. 469
Positive Lock Washer Co. 465
Post & Lester Co. 227
Powell Muffler & Timer Co. 435
Powers Spring Co. 371
Pratt & Whitney Co. 457
Premier Motor Mfg. Co. 153
Presto Inter-Rim Co. 337
Prest-O-Lite Co. 509
Prosser & Son, Thomas 381
Pruden Hardware Co., W. E. 227
Pruyn & Bilodeau 411
Pullman Motor Car Co. 193
Puncture Cure Sales Co. 487
Puritan Soap Co. 361
Pyrene Mfg. Co. 161

R

PAGE

Racine Rubber Co. 409
Rajah Auto-Supply Co. 403
Rauch & Lang Carriage Co. 153
Reliance Mfg. Co. 465
Remy Electric Co. 253
Riverside Steel Casting Co. 113
Robbins & Co., Irvin 75
Roessler & Hasslacher Chemical Co. 461
Rosen & Co., A. W. 139
Ross Gear & Tool Co. 183
Royal Equipment Co. 85
Rushmore Dynamo Works 433
Russel Motor Axle Co. Opposite Last Page
Rutenber Motor Co. 265
Rutter & Co., Arthur T. 507

S

Salisbury Wheel & Mfg. Co. 513
Salvador Motor Co. 545
Scaife & Sons Co., Wm. B. 399
Schleider Mfg. Co. 433
Schrader's Son, A. 435
Sears-Cross Co. 365
Sectional Steel Garage Co. 505
Shain, Chas. D. 97
Shaler Co., C. A. 439
Sharrer Patent Top Co. 415
Sheldon Axle Co. 283
Sier-Bath Co. 475
Signal Motor Truck Co. 43
Smith Bros. 151
Smith Co., A. O. 373
Smith & Co., Jos. N. 203
South Bend Lathe Works 505
Spacke Machine Co., F. W. 289
Speedwell Motor Car Co. 305
Spicer Mfg. Co. 225
Splitdorf Electrical Co. 277
Spring Perch Co. 367
Springfield Metal Body Co. 71
Stackpole Carbon Co. 481
Stam & Co., John B. 403
Standard Gauge Steel Co. 339
Standard Machinery Co. 431
Standard Metal Mfg. Co. 213
Standard Motor Truck Co. (Detroit, Mich.) 43
Standard Motor Truck Co. (Cleveland, Ohio) 41
Standard Thermometer Co. 403
Standard Welding Co. Book Mark
Standard Woven Fabric Co. 303
Stanley, John T. 361
Star Ball Retainer Co. 331
Star Porcelain Co. 315
Stark Tool Co. 503
Staybestos Mfg. Co. 57
Stearns Co., F. B. 309
Stevens, Frederic B. 523 and 524
Stevens & Co. 465
Stevens-Duryea Co. 133
Stewart-Warner Speedometer Corp. 365
Sulzberger & Sons Co. 201
Suspension Ball Bearing Co. 431
Sutherland Co., F. L. 485
Swedish Crucible Steel Co. 111
Syracuse Malleable Iron Works 405

T

Tanner-Hower Mfg. Co. 491
Taylor Mfg. Co. 317
Thermoid Rubber Co. 55
Titan Storage Battery Co. 491
Tolman Mfg. Co. 511
Trimont Mfg. Co. 555
Tubular Connecting Rod Co. Opposite Title Page
Tucker, W. H. & C. F. 143
Tuthill Spring Co. 395
Twitchell Gauge Co. 179

Digitized by Google

U

PAGE

Union Drawn Steel Co..... 387
Union Forging Co..... 473
U. S. Ball Bearing Mfg. Co..... 221
U. S. Light & Heating Co..... 389
United States Electrical Tool Co..... 479
United States Fastener Co..... 163
United States Gauge Co..... 558
United States Metal Products Co..... 83
United Steel Co..... 385
Universal Machine Co..... 225
Universal Mfg. Co..... 243

V

Van Dorn & Dutton Co..... 429
Van Wagner Mfg. Co., E. B..... 101
Vanguard Mfg. Co..... 349
Voorhees Rubber Mfg. Co..... 355
Vulcan Brazing & Machine Co..... 507

W

Wade Mfg. Co..... 361
Wainwright & Son, W. W..... 291
Walden Mfg. Co..... 555
Walker Carriage Co..... 73
Waltham Watch Co..... 119
Ward's Sons, Edgar T..... 489
Warm Hand Steering Wheel Corp..... 535
Warner Gear Co..... 239
Warner Mfg. Co..... 405
Waterbury Welding Co..... 445
Waukesha Motor Co..... 437
Wayne Wheel Co..... 447
Webb Mfg. Co..... 69

PAGE

Weed Chain Tire Grip Co.....Inside Front Cover
Weiss, L. T..... 245
Werra Aluminum Foundry Co..... 505
Western Automatic Machine Screw Co..... 343
Western Brass Mfg. Works..... 327
Western Drop Forge Co..... 525
Western Electric Co..... 421
Weston Electrical Instrument Co..... 499
Weston-Mott Co..... 51
Wheeler & Schebler..... 97
White & Bagley Co.....Back Cover
Whitehouse LeCompte Mfg. Co..... 509
Whiteley Bros..... 529
Whitney Mfg. Co..... 115
Willard Storage Battery Co..... 361
Willey Co., C. A..... 279
Willys-Overland Co..... 35
Wilmington Fibre Specialty Co..... 279
Wing Co., Charles..... 397
Winkley Co..... 79
Winsor Mfg. Co..... 445
Wisconsin Motor Mfg. Co..... 263
Worcester Pressed Steel Co..... 157
Woven Steel Hose & Rubber Co..... 531
Wyman & Gordon Co.....Back Bone

Y

Yale & Towne Mfg. Co..... 243
Yuster Axle Co..... 53

Z

Zinke Co..... 287

Manufacturers are requested to send us copies of all catalogues as soon as issued. This will assist us in listing your name in this Directory under the proper classification or classifications and will then be placed in our file for reference.

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INDEX TO CLASSIFICATIONS

COMPLETE VEHICLES

PAGE

Cyclecars 38
Electric Commercial Vehicles 44
Electric Pleasure Vehicles 36
Fire Apparatus, Motor Propelled 46
Gasoline Commercial Vehicles 38
Gasoline Pleasure Vehicles 33
Imported Commercial Vehicles 44
Imported Pleasure Vehicles 38
Steam Pleasure Vehicles 38
Taxicabs 44

PARTS, ACCESSORIES, SUPPLIES, MATERIALS, MACHINERY, TOOLS AND SHOP EQUIPMENT

A

Abrasive Papers—See Paper, Emery and Sand 520
Abrasive Wheels—See Wheels, Grinding 552
Accelerator Pedals—See Pedals, Special Accelerator 288
Accessories—See Supplies 288
Acetylene Burner Cleaners—See Cleaners, Acetylene Burner 118
Acetylene Burners—See Burners, Acetylene 88
Acetylene Gas Engine Starters—See Starters, Acetylene Gas Engine 374
Acetylene Gas Purifiers—See Purifiers, Acetylene Gas 320
Acetylene Generators—See Generators, Acetylene. 188
Acetylene Lamp Burners—See Burners, Acetylene Lamp 88
Acetylene Lamp Connectors—See Connectors, Acetylene Lamp 136
Acetylene Lamp Controllers—See Controllers, Acetylene Lamp 138
Acetylene Lamp Lighters—See Lighters, Acetylene Lamp 238
Acetylene Lamps or Headlights—See Lamps or Headlights, Acetylene 226
Acetylene Pressure Regulators—See Regulators Acetylene Pressure 328
Acetylene Tank Keys—See Keys, Acetylene 224
Acetylene Tanks—See Tanks, Acetylene 398
Acid, Battery—See Electrolyte, Storage Battery. 158
Acid, Soldering—See Flux, Soldering 488
Adapters, Electric Lamp 49
Adjustable Valve Lift Rods—See Rods, Adjustable Valve Lift 336
Adjustable Wrenches—See Wrenches, Nut and Bolt 552
Adjusters, Tire—See Tools, Tire 412
Agents—See Manufacturers Agents 252
Agitators, Fuel—See Mixers or Economizers, Fuel. 258
Air Cocks—See Cocks, Spring Key 124
also Cocks, Pet 124
Air Compressors—See Pumps and Air Compressors 528
Air Gauges—See Gauges, Steam 178
Air Moisteners—See Moisteners, Air or Mixture .. 260
Air Pumps—See Pumps 316
Air Separators—See Separators, Air 538
Alarms, Boiler—See Columns, Water 126
Alarms, Tail Light—See Indicators, Tail Light .. 218
Alarms, Tire 49
Alcohol, Denatured 49
Alligator Wrenches—See Wrenches, Nut and Bolt 552
Aluminum, Sheet and Rod 50
Aluminum Castings—See Castings, Aluminum .. 98
Aluminum Coated Steel—See Steel, Aluminum Coated 386
Aluminum Matting—See Matting, Aluminum 252
Aluminum Paints—See Paints, Aluminum 278
Aluminum Solder—See Solder, Aluminum 542
Aluminum Tubing—See Tubing, Aluminum 426
Ammeters, Pocket—See Gauges, Battery 174
Ammeters, Standard 50
Angle Benders—See Benders, Angle 456
Angle Steel—See Steel, Angle 378
Angle Valves—See Valves, Angle 432
Angular Belts—See Belts V 64
Annealing—See Treating, Heat 420
Annealing Boxes—See Boxes, Annealing 458
Annealing Furnaces—See Furnaces, Annealing .. 490
Annunciators, Automobile 50
Anti-Freezing Solutions—See Compounds, Anti-Freezing 128
Anti-Friction Metal—See Metals, Bearing 252
Anti-Rattlers, Door 50
Anti-Skid Devices—See Bands, Non-Skid 56
also Chains, Non-Skid 116
also Treads, Tire 418
Anvils, Blacksmiths and Machinists 455
Arbor Presses—See Presses, Arbor 526
Arbors—See Mandrels, Expanding 518
Arch Bars—See Supports, Hood 392
Arch Punches—See Punches, Arch and Washer .. 530
Artificial Leather—See Leather, Artificial 234
Artillery Wheels—See Wheels, Wood 448
Asbestos Packing—See Packing, Asbestos 276
Asbestos, Sheet 50
Auger Bits—See Bits, Auger 456
Autogenous Welding—See Welding, Autogenous .. 444
Autogenous Welding Machines—See Machines, Autogenous Welding 508
Autographic Registers—See Registers, Autographic and Manifold 534
Automatic Burners—See Burners, Special Acetylene Lamp 90
Automatic Cut-out Switches—See Switches, Automatic Cut-out 392
Automatic Fuel Shut-off Valves—See Valves, Automatic Fuel Shut-off 432
Automatic Gear Shifters—See Shifters, Automatic Gear 350
Automatic Headlight Brackets—See Brackets, Automatic Headlight 82
Automatic Screw Machines—See Machines, Screw. 516
Axle Ends—See Forgings, Drop 168
Axle Forgings—See Forgings, Drop 168
Axles, Cyclecar 50
Axles, Front 50
Axles, Rear 52
Axles, Rear with Transmission 52

B

Babbitt Bearings—See Metals, Bearing 252
Babbitt Hammer Molds—See Molds, Soft Hammer 520
Babbitt Melting Furnaces—See Furnaces, Babbitt Melting 490
Babbitt Metal—See Metals, Bearing 252
Backs, Metal Seat 52
Bags, Coat Rail 52
Bags, Robe Rail—See Bags, Coat Rail 52
Bags, Rubber Gas 54

Digitized by Google

PAGE

Bags, Grease—See Boots, Steering Knuckle..... 78
Bags, Inner Tube—See Cases, Tire..... 98
Bags, Tool..... 54
Balancing Ways—See Ways, Balancing..... 552
Ball Bearings—See Bearings, Ball..... 60
Ball Bearings, Regrinding of—See Regrinding of Ball Bearings..... 62
Ball Check Valves—See Valves, Ball Check..... 432
Ball Cones—See Cups, Ball..... 144
Ball Cups—See Cups, Ball..... 144
Ball Joints—See Joints, Ball..... 224
Ball Races—See Cups, Ball..... 144
Ball Retainers—See Retainers, Ball..... 332
Balls, Burnishing..... 455
Balls, Steel..... 54
Band Brakes—See Brakes, Expanding and Contracting..... 82
Band Saws—See Saws, Band..... 536
Bandage Wrapping Machines—See Machines, Tire Bandage Wrapping..... 518
Banding, Brake..... 54
Bands, Non-Skid..... 56
Bands, Tire Repair—See Sleeves, Tire Repair..... 356
Bar Cutters—See Cutters, Rod and Bar..... 474
Bar Steel—See Steel..... 380
Barrels, Shop—See Boxes, Sheet Metal Tote..... 458
Barrels, Tumbling..... 455
Bars, Arch—See Supports, Hood..... 392
Bars, Boring..... 455
Bars, Cored—See Metals, Bearing..... 252
Baskets, Dipping..... 455
Baskets, Touring—See Hampers, Touring..... 200
Batteries, Dry..... 56
Batteries, Storage..... 58
Battery Acid—See Electrolyte, Battery..... 158
Battery Box Locks—See Locks, Cabinet and Pad.. 242
also Catches, Spring..... 112
Battery Boxes—See Boxes, Battery..... 80
Battery Chargers—See Magnetos and Dynamos.. 250
also Dynamos, Battery Charging..... 156
also Rectifiers, Alternating Current.... 326
also Rheostats, Charging..... 332
Battery Charging Cut-outs—See Cut-outs, Thermostatic..... 148
Battery Charging Plugs—See Plugs, Charging.... 292
Battery Connections—See Connectors, Battery.. 136
Battery Gauges—See Gauges, Battery..... 174
Battery Holders—See Holders, Battery..... 206
also Boxes, Battery..... 80
Battery Jars—See Jars, Battery..... 224
Battery Switches—See Switches..... 392
Battery Testers—See Gauges, Battery..... 174
Beading Machines—See Machines, Crimping and Beading..... 512
Bearing Bronze—See Metals, Bearing..... 252
Bearing Metal—See Metals, Bearing..... 252
Bearing Scrapers—See Scrapers, Bearing..... 538
Bearings, Babbitt—See Metals, Bearing..... 252
Bearings, Ball..... 60
Bearings, Ball—Regrinding of..... 62
Bearings, Bronze—See Metals, Bearing..... 252
Bearings, Die Cast—See Castings, Die..... 106
Bearings, Oilless..... 456
Bearings, Roller..... 62
Bellows, Hand..... 456
Bell Ringers—See Pushes, Foot..... 320
Bells, Electric..... 62
Bells, Mechanical..... 62
Belt Dressing—See Dressing, Clutch..... 152
Belt Fasteners—See Fasteners, Belt..... 486
Belting, Leather..... 64
Belts, Endless Cotton—See Belts, Endless Fabric.. 64
Belts, Endless Fabric..... 64
Belts, Spiral Wire..... 64
Belts, V..... 64
Bench Lathes—See Lathes, Bench..... 502
Bench Vises—See Vises, Machinists..... 550
Benders, Angle..... 456
Bending Machines—See Machines, Wood Bending. 518
Bending Rolls—See Rolls, Bending..... 534
Bendings, Wood..... 66
Billikens—See Ornaments, Radiator..... 266
Binding, Mat and Carpet..... 66
Bindings, Upholstery..... 66
Bins, Shop—See Racks, Stock..... 532
Bit Braces—See Braces, Bit..... 458
Bits, Auger..... 456
Blackboards, Composition..... 456
Blades, Hack Saw..... 456
Blanks, Gear—See Gears, Blank..... 184
Blasts, Sand—See Machines, Sand Blast..... 516
Block Chain—See Chain, Transmission..... 114
Blocks, Chain—See Cranes, Portable..... 472

PAGE

Blocks, Swage—See Fullers and Swages..... 490
Blow Torches—See Torches, Gasoline..... 548
Blowers, Pressure..... 458
Blowout Patches—See Sleeves, Tire Repair..... 356
also Shoes, Inner Tire..... 352
Blue Printing Machines—See Machines, Blue Printing..... 508
Boards, Running—See Steps, Special..... 388
Bobs, Plumb..... 458
Bodies, Metal Commercial..... 66
Bodies, Metal Pleasure..... 68
Bodies, Special Dumping..... 76
Bodies, Wood Commercial..... 70
Bodies, Wood Pleasure..... 74
Body Glass—See Glass, Polished Plate..... 188
Body Irons—See Irons, Body..... 220
Body Lining—See Lining, Body or Frame..... 240
Body Polish—See Polishes, Automobile Body..... 302
Body Stock—See Lumber, Automobile..... 244
also Aluminum, Sheet..... 50
also Steel, Sheet..... 380
Boiler Alarms—See Columns, Safety..... 126
Boiler Columns—See Columns, Safety..... 126
Boiler Feed Pumps—See Pumps, Boiler Feed..... 320
Boiler Feed Regulators—See Regulators, Water Level..... 328
Boiler Injectors—See Injectors, Boiler Feeding.. 218
Boiler Shells—See Shells, Boiler..... 348
Boiler Tube Expanders—See Expanders, Boiler Tube..... 484
Boiler Water Gauges—See Gauges, Boiler..... 178
Boilers, Automobile Steam..... 76
Bolt and Screw Cases—See Cases, Bolt..... 462
Bolt Clippers—See Clippers, Bolt and Rivet..... 468
Bolt Heading Machines—See Machines, Bolt Heading..... 508
Bolt Pointing Machines—See Machines, Bolt Pointing..... 508
Bolt Threading Machines—See Machines, Bolt Threading..... 510
Bolt Wrenches—See Wrenches, Nut and Bolt.... 552
Bolts, Carriage—See Bolts, Machine..... 78
Bolts, Machine and Carriage..... 78
Bolts, Spring and Shackle..... 78
Bolts, Stove and Tire..... 78
Bolts, Tire—See Bolts, Stove..... 78
Bonnets, Motor—See Hoods, Motor..... 210
Bonnets, Under—See Pans, Dust..... 284
Boots, Motorists..... 78
Boots, Steering Knuckle..... 78
Boots, Top—See Covers, Top..... 144
Boring Bars—See Bars, Boring..... 455
Boring Heads—See Heads, Boring..... 500
Boring Machines—See Machines, Boring..... 518
Boring Mill Chucks—See Chucks, Boring Mill.... 464
Bouquet Holders—See Holders, Bouquet..... 206
Bow Clamps—See Holders, Top..... 210
Bow Holders—See Holders, Top..... 210
Bow Rests—See Rests, Bow..... 330
Bow Separators—See Separators, Bow..... 346
Bow Sockets—See Sockets, Bow..... 364
Bowden Wire—See Wire, Bowden..... 450
Bows, Top..... 80
Box Locks—See Locks, Cabinet and Pad..... 242
also Catches, Spring..... 112
Boxes, Annealing..... 458
Boxes, Case Hardening—See Boxes Annealing.. 458
Boxes, Extra Lamp Bulb—See Cases, Extra Lamp Bulb..... 96
Boxes, Hose..... 458
Boxes, Lunch—See Hampers, Touring..... 200
Boxes, Metal Battery..... 80
Boxes, Metal Tool..... 82
Boxes, Mitre..... 458
Boxes, Sheet Metal Tote..... 458
Boxes, Spark Coil..... 80
Boxes, Wood Battery..... 80
Boxes, Wood Tool..... 82
Braces, Bit..... 458
Brackets, Automatic Headlight..... 82
Brackets, Headlight..... 82
Brackets, Horn Button..... 82
Brackets, Side and Tail Lamp..... 82
Brake Bands—See Brakes, Expanding and Contracting..... 82
also Banding, Brake..... 54
Brake Cable—See Rope, Steel Wire..... 338
Brake Drums—See Drums, Brake..... 156
Brake Facing—See Banding, Brake..... 54
Brake Levers—See Levers, Brake..... 238
Brake Lining—See Banding, Brake..... 54
Brake Pedals—See Pedals, Ratchet..... 288
Brake Rods—See Rods, Brake..... 338

Digitized by Google

PAGE

Brakes, Drop 84
Brakes, Electric 82
Brakes, Expanding and Contracting 82
Brass, Brazing 458
Brass Castings—See Castings, Bronze and Brass 100
Brass, Dealers in—See Steel, Dealers in 378
Brass Hammers—See Hammers, Brass and Copper 498
Brass Melting Furnaces—See Furnaces, Brass Melting 492
Brass Radiator Caps—See Caps, Brass Radiator 92
Brass Rivets—See Rivets, Brass 334
Brass, Sheet and Rod 84
Brass, Iron Lined Tubing—See Tubing, Iron Lined 428
Brass Tubing—See Tubing, Brass 426
Braziers, Cast Iron 84
Brazing Brass—See Brass, Brazing 458
Brazing Compound—See Compounds, Brazing 468
Brazing Flux—See Compounds, Brazing 468
Brazing Spelter—See Brass, Brazing 458
Brazing Torches—See Torches, Gasoline 548
Breast Drills—See Drills, Breast 478
Broaching Presses—See Presses, Broaching 526
Broadcloth, Upholstery 84
Bronze Bearings—See Metals, Bearing 252
Bronze Bushings—See Metals, Bearing 252
Bronze Castings—See Castings, Bronze and Brass 100
Bronze Paints—See Paints, Aluminum 278
Bronze Wire Rope—See Rope, Bronze Wire 338
Brooms, Steel Wire 460
Brushes, Carbon Motor 84
Brushes, Foundry and Shop 460
Brushes, Paint and Varnish 460
Brushes, Spark Plug 84
Brushes, Varnish—See Brushes, Paint and Varnish 460
Buckets, Collapsible 84
Buckles, Strap 86
Buckles, Turn—See Turn-Buckles 430
Buffers, Electric Portable—See Drills, Electric, Portable 478
Buffing Compounds—See Compounds, Buffing 468
Buffing Lathes—See Machines, Buffing 510
Buffing Machines—See Machines, Buffing 510
Buffing Wheels—See Wheels, Buffing 552
Buildings, Portable—See Garages 172
Bulb Boxes—See Cases, Extra Lamp Bulb 96
Bulb Cases—See Cases, Extra Lamp Bulb 96
Bulb Guards—See Guards, Horn Bulb 196
Bulbs, Lamp—See Lamps, Miniature Tungsten 232
Bulbs, Rubber Horn 86
Bulldozers 460
Bumpers, Automobile 86
Bumpers, Rubber Spring 88
Burner Cleaners—See Cleaners, Acetylene Burner 118
Burners, Acetylene Lamp 88
Burners, Automatic Lighting—See Special Acetylene Lamp Burners 90
Burners, Automatic and Electric Lighting—See Special Acetylene Lamp Burners 90
Burners, Electric Lighting—See Special Acetylene Lamp Burners 90
Burners, Gasoline and Kerosene 90
Burners, Special Acetylene Lamp 90
Burnishing Balls—See Balls, Burnishing 455
Bushings, Bronze—See Metals, Bearing 252
Bushings, Starter or Primer Attaching 90
Button Machines—See Machines, Upholstery Button 518
Buttons, Upholstery 90

C

Cable, Ignition—See Wire, Insulated 450
Cable, Wire—See Rope 338
Cables, Top 90
Cabinet Locks—See Locks, Cabinet and Pad 242
Calcium Carbide—See Carbide, Calcium 92
Calipers and Dividers 460
Cam Cutting Machines—See Machines, Cam Cutting 510
Cam-Shafts Finished or Machined 90
Canopies, Automobile—See Tops, Automobile 414
Cans, Gasoline 460
Cans, Oiling 90
Cans, Waste 462
Canvas Buckets—See Buckets, Collapsible 84
Cap Screws—See Screws, Cap 340
Cape Chisels—See Chisels, Cold and Cape 462
Cape Tops—See Tops, Automobile 414
Caps, Brass Radiator 92
Caps, Hub 92
Caps, Motorists 92
Caps, Rubber Radiator 92
Carbide, Calcium 92
Carbon Brushes—See Brushes, Carbon 84
Carbon Removers—See Removers, Carbon 328
Carbon Removing Compounds—See Compounds, Carbon Removing 128
Carbon Removing Machines—See Machines, Motor Decarbonizing 514
Carbon Scrapers—See Scrapers, Carbon 340
Carbonia Finish—See Treating, Heat 420
Carbonizing—See Treating, Heat 420
Carborundum Paper—See Paper, Emery and Sand 520
Carborundum Wheels—See Wheels, Grinding 552
Carbureter Floats—See Floats, Carbureter 168
Carbureters, Gasoline 94
Carbureters, Kerosene 96
Card Cases—See Cases, Toilet 98
Carpet Binding—See Binding, Mat and Carpet 66
Carpet, Coach 96
Carriage Bolts—See Bolts, Machine 78
Case-Hardening—See Treating, Heat 420
Case-Hardening Boxes—See Boxes, Annealing and Case-Hardening 458
Case-Hardening Compounds—See Compounds, Case-Hardening 470
Case-Hardening Furnaces—See Furnaces, Annealing 490
Cases, Battery—See Boxes, Battery 80
Cases, Bolt and Screw 462
Cases, Card—See Cases, Toilet and Card 98
Cases, Curtain 96
Cases, Extra Lamp Bulb 96
Cases, Medical Emergency 96
Cases, Spark Coil—See Boxes, Spark Coil 80
Cases, Spark Plug 96
Cases, Tire and Tube 98
Cases, Toilet and Card 98
Cases, Tool—See Bags, Tool 54
also Boxes, Tool 82
Cast Iron Cement—See Cement, Cast Iron 112
Cast Steel Wheels—See Wheels, Cast Steel 446
Castle Nuts—See Nuts, Castellated 266
Castings, Aluminum 98
Castings, Bronze and Brass 100
Castings, Die 106
Castings, Gray Iron 106
Castings, Malleable Iron 108
Castings, Steel 110
Castors, Wrecking—See Trucks and Castors, Wrecking 422
Castors and Wheel Trucks 112
Catches, Spring Cabinet 112
Celluloid, Sheet 112
Cement, Cast Iron 112
Cement, Metal—See Cement, Cast Iron 112
Cement, Radiator Repair 112
Cement, Tire Repair 114
Cement Mixers—See Mixers, Rubber Cement 520
Center Gauges—See Gauges, Center 492
Center Punches—See Punches, Center 530
Centering Drills—See Drills, Centering 478
Centering Jigs—See Jigs, Speedometer Gear Centering 224
Centrifugal Dryers—See Dryers, Centrifugal 484
Chain Blocks—See Cranes, Portable 472
Chain Lubricant—See Greases 190
also Graphite 190
Chain Tools—See Tools, Chain Repair 410
Chain, Transmission 114
Chains or Grips, Non-Skid 116
Chains, Driving—See Chain, Transmission 114
Chains, Non-Skid—See Chains or Grips, Non-Skid 116
Chains, Tire—See Chains or Grips, Non-Skid 116
Chairs, Supplementary—See Seats, Supplementary 346
Chamfering Machines—See Machines, Gear Tooth Chamfering 512
Chamois—See Sponges and Chamois 366
Channel Steel—See Steel, Angle 378
Channels, Pressed Steel—See Frames, Pressed Steel 170
Chaplets, Foundry 462
Chargers, Battery—See Magnetos and Dynamos 250
also Dynamos, Battery Charging 156
also Rectifiers, Alternating Current 326
Charging Apparatus—See Dynamos 156
also Ammeters 50
also Panels 282
also Plugs 292
also Rectifiers 326
also Rheostats 332

Digitized by Google

PAGE

Chauffeur's Telephones—See Telephones, Limousine 402
Check Valves—See Valves, Angle 432
also Valves, Ball Check 432
Checks, Steering Gear 116
Chemical Plating Compounds—See Compounds, Chemical Plating 130
Chemical Fire Tanks—See Tanks, Chemical Fire 546
Chemicals, Engine Priming—See Solution, Priming. 364
Chimes, Exhaust—See Horns, Exhaust 214
Chipping Hammers—See Tools, Pneumatic 546
Chisels, Cape—See Chisels, Cold and Cape 462
Chisels, Cold and Cape 462
Chisels and Gouges, Woodworkers 464
Chrome Nickel Steel—See Steel, Chrome Nickel 384
Chucking Grinders—See Grinders, Chucking 494
Chucks, Boring Mill 464
Chucks, Drill 464
Chucks, Lathe 464
Chucks, Magnetic 466
Chucks, Milling Machine 466
Chucks, Planer 466
Chucks, Pneumatic 466
Chucks, Screw Machine 466
Cigar Lighters—See Lighters, Electric Cigar 240
Circle Cutters—See Cutters, Washer or Gasket 474
Circular Saws—See Saws, Circular 536
Circulating Pumps—See Pumps, Water 320
Circulation Gauges—See Gauges, Water Circulation 180
Clamps, Bow—See Holders, Top 210
Clamps, Hose 116
Clamps, Spring Repair 116
Clamps, Machinists 466
Clamps, Top—See Holders, Top 210
Clamps, Wire Rope 116
Clamps, Woodworkers 466
Claw Hammers—See Hammers, Claw 498
Cleaners, Acetylene Burner 118
Cleaners, Automobile Engine 466
Cleaners, Fabric 118
Cleaners, Glass Wind Shield 118
Cleaners, Mechanical—See Cleaners, Glass Wind Shield 118
Cleaners, Mineral 468
Cleats, Fibre Wiring 118
Clippers, Bolt and Rivet 468
Clippers, Rivet—See Clippers, Bolt and Rivet 468
Clips, Curtain 118
Clips, Hat—See Hangers, Hat 202
Clips, Spring 118
Clips, Trimmers 118
Clocks, Dashboard 118
Cloth, Enameled 120
Cloth, Mohair 120
Cloth, Rubber 120
Cloth, Upholstery—See Broadcloth 84
also Silk 356
also Whipcord 450
Cloth, Wire 122
Clothes Lockers—See Lockers, Metal Clothes 506
Clothing, Motorists 122
Cloths, Polishing—See Wipers 450
Clutch Compounds—See Dressing Clutch and Belt. 152
Clutch Discs—See Discs, Steel Clutch 152
Clutch Dressing—See Dressing, Clutch 152
Clutch Lining—See Banding, Brake 54
also Leather, Friction 234
Clutches, Automobile Friction 122
Coach Lace—See Lace, Coach 226
Coach Screws—See Screws, Coach 340
Coat Rail Bags—See Bags, Coat Rail 52
Coats, Motorists—See Clothing, Motorists 122
Cocks, Reserve—See Valves, Two Way Tank 436
Cocks, Spring Key 124
Cocks, Standard Pet 124
Cocoa Mats—See Mats, Cocoa 252
Coil Boxes—See Boxes, Spark Coil 80
Coil Springs—See Springs, Machinery 368
Coils, Pipe 126
Coils, Spark 126
Cold Chisels—See Chisels, Cold and Cape 462
Cold Rolled Steel—See Steel, Cold Rolled 380
Cold Saws—See Saws, Cold 536
Collapsible Buckets—See Buckets, Collapsible 84
Collapsible Pails—See Buckets, Collapsible 84
Collapsible Spades and Shovels—See Spades and Shovels, Collapsible 364
Collectors, Commercial 126
Collectors, Dust 468
Coloring—See Treating, Heat 420
Colors, Automobile—See Paints and Colors 278
Columns, Water 126

PAGE

Commercial Collectors—See Collectors, Commercial. 126
Commutators, Dynamo—See Commutators, Electric Motor 126
Commutators, Electric Motor 126
Commutators, Gas Engine—See Timers, Ignition. 404
Compensating Gears—See Gears, Differential 180
Composition Blackboards—See Blackboards, Composition 456
Composition Castings—See Castings, Bronze and Brass 100
Composition, Insulating 126
Compounds, Anti-Freezing 128
Compounds, Brazing 468
Compounds, Buffing and Polishing 468
Compounds, Case Hardening 470
Compounds, Carbon Removing 128
Compounds, Chemical Plating 130
Compounds, Chemical Priming—See Solution, Priming 364
Compounds, Core 470
Compounds, Glass Wind Shield 130
Compounds, Polishing—See Compounds, Buffing and Polishing 468
Compounds, Puncture Sealing 130
Compounds, Radiator Cleaning 132
Compounds, Tire Filling 132
Compounds, Tire Preserving 132
Compounds, Tire Repair 132
Compounds, Valve Grinding 134
Compounds, Welding 470
Compounds, Wind Shield—See Compounds, Glass Wind Shield 130
Compressed Air Engine Starters—See Starters, Compressed Air Engine 376
Compression Gauges—See Gauges, Cylinder Compression 178
Compression Meters—See Gauges, Cylinder Compression 178
Compression Relief Cocks—See Cocks 124
also Cups, Spring Key 148
Compression Testers—See Gauges, Cylinder Compression 178
Compressors, Air—See Pumps and Air Compressors 528
Condensers, Steam 134
Cones, Ball—See Cups, Ball 144
Connecting Rods—See Rods, Connecting 338
Connections, Brass Water 134
Connections, Gas Tubing 136
Connections, Spark Lever—See Joints, Ball 224
Connections, Steering 136
Connections, Throttle Lever—See Joints, Ball 224
Connections, Tire Pump 136
Connectors, Acetylene Lamp 136
Connectors, Battery 136
Connectors, Electric Lamp 138
Contract Work—See Machine Work 246
also Products, Screw Machine 342
Controllers, Acetylene Lamp 138
Controllers, Acetylene Lamp—See also Regulators, Acetylene Pressure 328
Controllers, Electric Motor 138
Controllers, Speed 138
Conveyors, Sand—See Machinery, Sand Mixing and Conveying 508
Coolers, Water—See Radiators, Water Cooling 322
Copper Castings—See Castings, Bronze and Brass 100
Copper Gaskets—See Gaskets, Metallic 174
Copper Hammers—See Hammers, Brass and Copper 498
Copper Melting Furnaces—See Furnaces, Brass and Copper Melting 492
Copper Rivets—See Rivets, Brass 334
Copper Rod—See Brass, Sheet 84
Copper Sheet—See Brass, Sheet 84
Copper Tube—See Tubing, Brass 426
Cord, Coach—See Lace, Coach 226
Cords, Seaming 138
Core Baking Ovens—See Ovens, Core Baking 520
Core Compounds—See Compounds, Core 470
Core Machines—See Machines, Core Making 510
Core Wire Cutting Machines—See Machines, Core Wire Straightening 510
Core Wire Straightening Machines—See Machines, Core Wire Straightening 510
Cored Bars—See Metals, Bearing 252
Cores, Spark Plug—See Lava 234
also Mica 256
also Porcelain 314
Cores, Tire Vulcanizing—See Molds, Tire Vulcanizing 520
Cork Floats—See Floats, Cork 168
Cork Inserts, Brake and Clutch 138
Cork Washers—See Washers, Cork 440

Digitized by Google

PAGE

Corundum Wheels—See Wheels, Grinding..... 552
Cotter Pin Pullers—See Pullers, Cotter Pin..... 526
Cotter Pins—See Pins, Cotter 288
Cotters, Spring—See Pins, Cotter..... 288
Cotton Belts—See Belts, Fabric..... 64
Cotton Felt Upholstery—See Moss, Upholstery.... 262
Cotton Waste—See Waste, Cotton..... 444
Counterbores 470
Countershafts..... 138
Countershafts, Cyclecar—See Axles, Cyclecar.... 50
Countersinks..... 470
Couplings, Hose—See Clamps, Hose..... 116
Couplings, Magneto..... 140
Couplings, Pipe—See Fittings, Pipe..... 164
Couplings, Solderless—See Unions, Tubing..... 432
Covers, Automobile..... 140
Covers, Hood—See Covers, Radiator..... 142
Covers, Joint—See Boots, Steering Knuckle..... 78
Covers, Lamp..... 140
Covers, Leather Magneto..... 140
Covers, Magneto—See Covers, Leather Magneto. 140
Covers, Oil Hole..... 142
Covers, Paper Shipping..... 142
Covers, Radiator and Hood..... 142
Covers, Slip..... 142
Covers, Starting Crank—See Holders, Starting Crank..... 208
Covers, Steering Knuckle—See Boots, Steering Knuckle..... 78
Covers, Top..... 144
Covers, Universal Joint—See Boots, Steering Knuckle..... 78
Covers, Upholstery—See Covers, Slip..... 142
Covers or Grips, Steering Wheel 142
Cranes, Portable 472
Crank Handles—See Handles, Starting Crank.... 202
Crank Holders—See Holders, Starting Crank..... 208
Crank Pin Grinders—See Grinders, Crank Pin..... 494
Crank Pin Lathes—See Lathes, Crank Pin..... 502
Cranks, Safety Starting..... 144
Crankshafts..... 144
Creepers—See Trucks, Repair..... 422
Crimping Machines—See Machines, Crimping..... 512
Cross-Cut Saws—See Saws, Hand..... 536
Crucibles, Metal Melting..... 472
Cuff Protectors—See Protectors, Sleeve..... 314
Cup Greases—See Greases, Cup..... 190
Cupolas, Foundry..... 472
Cups, Ball..... 144
Cups, Oil and Grease 146
Cups, Ordinary Priming—See Cocks, Standard Pet 124
Cups, Spring Key Priming..... 148
Cups, Spring Leaf Oiling..... 148
Curb Boxes—See Boxes, Hose..... 458
Curled Hair—See Hair, Upholstery..... 200
Current Rectifiers—See Rectifiers, Alternating Current..... 326
Curtain Cases—See Cases, Curtain..... 96
Curtain Clips—See Clips, Curtain..... 118
Curtain Fasteners—See Fasteners, Curtain..... 162
Curtain Opening Fittings—See Fittings, Curtain Opening..... 164
Curtain Rollers—See Rollers, Curtain..... 338
Curtains, Special Top..... 148
Cushion Springs—See Springs, Seat..... 368
Cushions, Special Seat..... 148
Cut Meters—See Meters, Cut..... 518
Cut-Out Pedals—See Pedals, Horn..... 392
Cut-out Switches—See Switches, Automatic Cut-out..... 392
Cut-Outs, Muffler—See Valves, Muffler Cut-Out.. 434
Cut-outs, Thermostatic..... 148
Cutter Grinders—See Grinders, Reamer..... 496
Cutters, Bar—See Cutters, Rod and Bar..... 474
Cutters, Gasket—See Cutters, Washer or Gasket.. 474
Cutters, Milling..... 474
Cutters, Pipe..... 474
Cutters, Rod and Bar..... 474
Cutters, Sprue..... 474
Cutters, Washer or Gasket..... 474
Cutters, Wood Forming..... 474
Cutting Lubricants—See Lubricants, Cutting.. 506
Cutting Machines—See Machines, Abrasive Metal Cutting..... 508
also Machines, Core Wire Straightening..... 510
Cutting Off Machines—See Machines, Cutting Off 512
also Saws, Cold..... 536
Cutting Off Saws—See Saws, Cold..... 536
Cutting Oils—See Lubricants, Cutting..... 506
Cyanide Hardening—See Treating, Heat..... 420
Cyclecar Axles—See Axles, Cyclecar..... 50

PAGE

Cyclecar Differential Gears—See Gears, Cyclecar Differential..... 180
Cyclecar Jack Shafts—See Axles, Cyclecar..... 50
Cyclecar Motors—See Motors, Gasoline Cyclecar.. 262
Cyclecar Steering Gears—See Gears, Cyclecar Steering..... 180
Cyclecar Transmission Gears—See Gears, Cyclecar Transmission..... 182
Cylinder Boring Machines—See Machines, Boring 510
Cylinder Castings—See Castings, Gray Iron..... 106
Cylinder Cleaning Compounds—See Compounds, Carbon Removing..... 128
Cylinder Cleaning Machines—See Machines, Motor Decarbonizing..... 514
Cylinder Grinders—See Grinders, Cylinder..... 494
Cylinder Oils—See Oils..... 268
Cylinders, Finished or Machined..... 150

D

Dash Boards—See Dashes..... 150
Dashboard Clocks—See Clocks, Dashboard..... 118
Dashboard Lamps—See Lamps, Electric..... 228
Dashboard Mirrors—See Mirrors, Adjustable.... 258
Dashes, Leather..... 150
Dashes, Metal..... 150
Dashes, Wood..... 150
Dealers in Accessories—See Supplies..... 392
Decalcomania Transfers—See Transfers, Decalcomania..... 418
Decarbonizing Machines—See Machines, Motor Decarbonizing..... 514
Demountable Rims—See Rims, Removable..... 332
Demountable Wheels—See Wheels, Demountable. 446
Denatured Alcohol—See Alcohol Denatured..... 49
Depth Gauges—See Gauges, Depth..... 492
Detachable Rims—See Rims, Removable..... 332
Die Cast Bearings—See Castings, Die..... 106
Die Castings—See Castings, Die..... 106
Die Stocks—See Stocks, Die..... 544
Dies, Screw Cutting—See Taps and Dies..... 546
Differential Gears—See Gears, Differential..... 180
Dimmers or Shades, Headlight..... 150
Dipping Baskets—See Baskets, Dipping..... 455
Disc Grinders—See Grinders, Disc..... 494
Discs, Friction—See Frictions, Fibre..... 170
Discs, Radiator..... 150
Discs, Steel Clutch..... 152
Distributors, Spark—See Timers, Ignition..... 404
Dividers—See Calipers and Dividers..... 460
Dogs, Lathe..... 476
Dome Lights—See Lights, Electric Dome..... 240
Door Anti-Rattlers—See Anti-Rattlers, Door.... 50
Door Curtain Fittings—See Fittings, Curtain Opening..... 164
Door Handles—See Handles, Door..... 200
Door Hinges—See Hinges, Door..... 204
Door Locks—See Locks, Door..... 242
Dope Injectors—See Guns, Grease..... 198
Dowels, Patternmakers 476
Drag Links—See Connections, Steering..... 136
Dressers, Emery Wheel..... 476
Dressing, Clutch and Belt..... 152
Dressing, Leather..... 152
Dressing, Mohair Top..... 154
Drill, Enameled—See Cloth, Enameled..... 120
Drill Chucks—See Chucks, Drill..... 464
Drill Gauges—See Gauges, Drill..... 464
Drill Grinders—See Grinders, Drill..... 494
Drill Press Vises—See Vises, Drill Press..... 548
Drill Racks—See Racks, Drill..... 532
Drills, Blacksmiths—See Drills, Post..... 478
Drills, Breast..... 478
Drills, Centering..... 478
Drills, Electric Portable..... 478
Drills, Multiple Spindle..... 478
Drills, Pneumatic—See Tools, Pneumatic 548
Drills, Post..... 478
Drills, Radial 478
Drills, Ratchet..... 480
Drills, Sensitive..... 480
Drills, Tapping—See Drills, Upright..... 480
Drills, Turret..... 480
Drills, Twist..... 480
Drills, Upright..... 480

Digitized by Google

PAGE

Drip Cocks—See Cocks..... 124
Drip Pans—See Pans, Drip..... 284
Drive Shafts—See Shafts, Propeller..... 348
Drivers, Screw..... 482
Driveway Gates—See Gates, Automatic..... 174
Drop Brakes—See Brakes, Drop..... 84
Drop Forged Wrenches—See Wrenches, Nut and Bolt..... 552
Drop Forgings—See Forgings, Drop..... 168
Drop Hammers—See Hammers, Power..... 498
Drums, Brake..... 156
Dry Batteries—See Batteries, Dry..... 56
Dryers, Centrifugal..... 484
Dryers, Sand..... 484
Duck, Enameled—See Cloth, Enameled..... 120
Dumping Bodies—See Bodies, Special Dumping.. 76
Dust Exhaust Systems—See Collectors, Dust.... 468
Dust Pans—See Pans, Dust..... 284
Dust Rings—See Washers, Felt..... 440
Dusters—See Clothing, Motorists..... 122
Dye, Top Lining..... 156
Dynamos, Battery Charging..... 156
Dynamos, Electric Lighting and Battery Charging 156
Dynamos, Ignition—See Magnetos, Ignition.... 250
Dynamometers, Electric Testing..... 156
Dynamometers, Hydraulic Testing..... 156

PAGE

Endless Belts—See Belts, Spiral Wire..... 64
also Belts, Endless Fabric..... 64
Engine Cleaners—See Cleaners, Auto Engine.... 466
Engine Lathes—See Lathes, Engine..... 504
Engine Primers—See Primers, Gasoline Engine. 314
Engine Starters—See Starters..... 374
also Primers, Gasoline Engine... 314
Engine Testing Dynamometers—See Dynamometers, Testing..... 156
Engine Valves—See Valves, Gas Engine..... 432
Engines, Gasoline—See Motors, Gasoline..... 262
Engines, Steam..... 160
Envelopes, Top—See Covers, Top..... 144
Equalizing Gears—See Gears, Differential..... 180
Escutcheon Pins—See Pins, Escutcheon..... 288
Exhaust Horns—See Horns, Exhaust..... 214
Exhaust Manifolds—See Manifolds, Exhaust.... 250
Exhaust Pipe Paints—See Paints, Exhaust Pipe. 280
Exhaust Whistles—See Horns, Exhaust..... 214
Expanders, Boiler Tube..... 484
Expanding Brakes—See Brakes, Expanding... 82
Expanding Mandrels—See Mandrels, Expanding 518
Extinguishers, Automobile Fire..... 160
Extinguishers, Fire..... 484
Extractors, Broken Tap..... 486
Eye Protectors—See Goggles, Mechanics and Welders..... 494
Eye Shields—See Goggles..... 190
Eyes—See Screw-Eyes..... 340

E

Eagles—See Ornaments, Radiator..... 266
Economizers, Fuel—See Mixers or Agitators, Fuel 258
Ejectors, Steam..... 158
Elbows, Pipe—See Fittings, Pipe..... 164
Electric Bells—See Bells, Electric..... 62
Electric Brakes—See Brakes, Electric..... 82
Electric Engine Starters—See Starters, Electric Engine..... 376
Electric Lamp Adapters—See Adapters, Electric Lamp..... 49
Electric Lamp Sockets—See Sockets, Electric Lamp. 364
Electric Lighting Burners—See Burners, Special Acetylene Lamp..... 90
Electric Lighting Dynamos—See Dynamos, Electric Lighting..... 156
Electric Lighting Systems—See Systems, Electric Lighting..... 396
Electric Mixture Heaters—See Heaters, Mixture.. 204
Electric Motor Commutators—See Commutators, Electric Motor..... 126
Electric Motors—See Motors, Electric Automobile. 262
Electric Portable Buffers—See Drills, Electric Portable..... 478
Electric Portable Drills—See Drills, Electric Portable..... 478
Electric Portable Grinders—See Drills, Electric Portable..... 478
Electric Portable Polishers—See Drills, Electric Portable..... 478
Electric Welding—See Welding, Electric..... 446
Electric Welding Machines—See Machines, Electric Welding..... 512
Electro Magnetic Lifting Tools—See Tools, Electro Magnetic Lifting..... 410
Electro-Plating Supplies—See Supplies, Electro Plating..... 544
Electrolyte, Storage Battery..... 158
Elevating Bodies—See Bodies, Special Dumping... 76
Elevators, Garage..... 484
Emblem Holders—See Holders, Flag, Pennant and Emblem..... 206
Emblems—See Flags, Pennants and Emblems.. 166
Emergency Cases—See Cases, Medical..... 96
Emergency Ropes—See Ropes, Tow..... 338
Emergency Tanks—See Tanks, Emergency..... 398
Emery Grinders—See Grinders..... 494
Emery Paper—See Paper, Emery..... 520
Emery Wheel Dressers—See Dressers, Emery Wheel..... 476
Emery Wheels—See Wheels, Grinding..... 552
Enameled Cloth—See Cloth, Enameled..... 120
Enameling Oven—See Ovens, Enameling..... 520
Enamels—See Paints, Enamel..... 280
Enamels, Lacquers and Finishes, Brass..... 160

F

Fabric Belts—See Belts, Endless Fabric..... 64
Fabric Cleaners—See Cleaners, Fabric..... 118
Facings, Brake—See Banding, Brake..... 54
Facings, Clutch—See Banding, Brake..... 54
also Leather, Friction..... 234
Facings, Foundry..... 486
Facings, Friction—See Frictions, Fibre..... 170
Factory Stools—See Stools, Steel..... 544
Factory Supplies—See Supplies, Machine Shop.. 544
Fan Belts—See Belts, Spiral Wire..... 64
also Belts, Endless Fabric..... 64
also Belting, Leather..... 64
Fans, Radiator..... 160
Fasteners, Belt..... 486
Fasteners, Curtain..... 162
Fasteners, Hood..... 162
Fasteners, Spring Cabinet—See Catches, Spring.. 112
Feed Water Heaters—See Heaters, Feed Water.. 204
Feeders, Water—See Moisteners, Air or Mixture.. 260
Felloes, Wood—See Rims, Wood..... 334
Felt Cotton Upholstery—See Moss, Upholstery.... 262
Felt Washers—See Washers, Felt..... 440
Fenders, Automobile..... 162
Fenders and Guards—See Guards, Mud..... 198
Fibre, Hard..... 162
Fibre Cleats—See Cleats, Fibre..... 118
Figures, Metal Pattern—See Letters, Pattern.... 506
File Handles—See Handles, File and Tool..... 500
File Sharpeners—See Sharpeners, File..... 540
Files and Rasps..... 486
Filing Machines—See Machines, Filing..... 512
Fillers, Paint..... 164
Fillers, Tire—See Compounds, Tire Filling..... 132
Fillets, Leather—See Fillets, Wood..... 486
Fillets, Wood..... 486
Filling Compounds—See Compounds, Tire Filling 132
Finish, Carbonia—See Treating, Heat..... 420
Finish, Gun Metal—See Treating, Heat..... 420
Finished Pistons—See Pistons, Finished and Machined..... 290
Finishing Washers—See Washers, Finishing..... 440
Fins, Radiator—See Discs, Radiator..... 150
Fire Extinguishers—See Extinguishers, Fire.... 484
also Extinguishers, Automobile Fire 160
Fire Pots—See Furnaces, Soldering..... 492
Fire Prevention Valves—See Valves, Automatic Fuel Shut-off..... 432
Fire Tube Boilers—See Boilers..... 76
Fittings, Curtain Opening..... 164
Fittings, Pipe..... 164
Fittings, Solderless—See Unions, Tubing..... 432
Fittings, Top..... 166

Digitized by Google

PAGE

Fittings, Top Lifting—See Lifters, One Man Top.. 238
Flag Holders—See Holders, Flag, Pennant and Emblem.... 206
Flags, Pennants and Emblems.... 166
Flanges, Hub.... 166
Flash Boilers—See Boilers.... 76
Flasks, Foundry.... 488
Flat Belts—See Belting, Leather.... 64
Flexible Metal Hose—See Tubing, Flexible Metallic. 428
Flexible Shafts—See Shafting, Flexible.... 348
Flexible Tubing—See Tubing, Flexible.... 428
Floats, Cork Carbureter.... 168
Floats, Metal Carbureter.... 168
Floor Mats—See Carpet, Coach.... 96
also Linoleum.... 240
also Mats, Rubber.... 252
Flower Vases—See Holders, Bouquet.... 206
Fluids, Engine Priming—See Solution, Priming.... 364
Flux, Brazing—See Compounds, Brazing.... 468
Flux, Soldering.... 488
Flux, Welding—See Compounds, Welding.... 470
Fly Wheel Balancers—See Ways, Balancing.... 552
Folding Pails—See Buckets, Collapsible.... 84
Foot Pushes—See Pushes, Foot.... 320
Foot Rests—See Rests, Foot.... 330
also Hassocks, Automobile.... 202
Foot Scrapers—See Scrapers, Foot.... 340
Foot Stirrups—See Stirrups, Jack Handle.... 388
Foot Switches—See Switches, Foot.... 392
Foot Warmers—See Heaters, Automobile.... 204
Footman Loops—See Loops, Brass Snap and Strap.. 242
Forcing Presses—See Presses, Arbor.... 526
Fore-Door Ventilators—See Ventilators, Limousine and Fore-door.... 438
Forge Blowers—See Blowers, Pressure.... 458
Forges, Blacksmiths.... 488
Forgings, Drop.... 168
Forming Cutters—See Cutters, Wood Forming.. 474
Forming Lathes—See Lathes, Forming.... 504
Foundry Brushes—See Brushes, Foundry.... 460
Foundry Facings—See Facings, Foundry.... 486
Foundry Supplies—See Supplies, Foundry.... 544
Frame Lining—See Lining, Body or Frame.... 240
Frames, Automobile—See Frames, Pressed Steel.. 170
Frames, Hack Saw.... 490
Frames, Pressed Steel.... 170
Friction Clutches—See Clutches, Friction.... 122
Friction Discs—See Frictions, Fibre.... 170
Friction Leather—See Leather, Friction.... 234
Frictions, Fibre.... 170
Fuel Economizers—See Mixers, Economizers or Agitators, Fuel.... 258
Fuel Level Indicators—See Gauges, Gasoline Tank. 178
Fuel Mixers—See Mixers, Economizers or Agitators 258
also Vaporizers.... 436
Fuel Regulators—See Regulators, Fuel Feed.... 328
Fuel Savers—See Mixers, Economizers or Agitators. 258
Fuel Shut-off Valves, Automatic—See Valves, Automatic Fuel Shut-off.... 432
Fuel Strainers—See Funnels, Gasoline.... 490
also Strainers, Gasoline.... 388
Fullers and Swages.... 490
Funnels, Gasoline.... 490
Fur Boots—See Boots, Motorists.... 78
Fur Coats—See Clothing, Motorists.... 122
Fur Gloves—See Gloves, Motorists.... 188
Furnaces, Annealing and Case Hardening.... 490
Furnaces, Babbitt Melting.... 490
Furnaces, Brass and Copper Melting.... 492
Furnaces, Case Hardening—See Furnaces, Annealing and Case Hardening.... 490
Furnaces, Copper Melting—See Furnaces, Brass and Copper Melting.... 492
Furnaces, Gasoline—See Torches, Gasoline.... 548
Furnaces, Kerosene—See Torches, Kerosene.... 548
Furnaces, Soldering.... 492

G

Galvanizing.... 170
Gaps, Spark.... 172
Garage Cans—See Cans, Gasoline.... 460
Garage Elevators—See Elevators, Garage.... 484
Garage Heaters—See Heaters, Special Garage.... 500
Garage Supplies—See Supplies, Machine Shop.. 544

PAGE

Garage Tire Pumps—See Pumps and Air Compressors.... 528
Garages.... 172
Gas Analysis Instruments—See Instruments, Gas Analysis.... 218
Gas Bags—See Bags, Rubber Gas.... 54
Gas Burners—See Burners, Acetylene.... 88
Gas Generators—See Generators, Acetylene.... 188
Gas Lamps—See Lamps, Acetylene.... 226
Gas Pliers—See Pliers, Combination.... 522
Gas Purifiers—See Purifiers, Acetylene Gas.... 320
Gas Tank Keys—See Keys, Acetylene.... 224
Gas Tanks—See Tanks, Acetylene.... 398
Gas Tubing Connections—See Connections, Gas Tubing.... 136
Gasket Cutters—See Cutters, Washer or Gasket.. 474
Gaskets, Cork—See Washers, Cork.... 440
Gaskets, Fiber—See Cans, Waste.... 462
Gaskets, Metallic.... 174
Gaskets, Rubber or Composition—See Packing.. 276
Gasoline.... 174
Gasoline Burners—See Burners, Gasoline.... 90
Gasoline Cans—See Cans, Gasoline.... 460
Gasoline Carbureters—See Carbureters, Gasoline.. 94
Gasoline Cocks—See Cocks.... 124
Gasoline Economizers—See Mixers, Economizers or Agitators, Fuel.... 258
Gasoline Engine Starters—See Starters.... 374
Gasoline Funnels—See Funnels, Gasoline.... 490
Gasoline Furnaces—See Torches, Gasoline.... 548
Gasoline Lock Valves—See Valves, Gasoline Lock 432
Gasoline Meters—See Meters, Gasoline or Oil.... 518
Gasoline Mixers—See Mixers, Economizers or Agitators, Fuel.... 258
Gasoline Motors—See Motors, Gasoline.... 262
Gasoline Primers—See Primers, Gasoline.... 314
Gasoline Reserve Cocks—See Valves, Two Way Tank.... 436
Gasoline Reserve Valves—See Valves, Two Way Tank.... 436
Gasoline Savers—See Mixers, Economizers or Agitators, Fuel.... 258
Gasoline Separators—See Strainers, Gasoline.... 388
Gasoline Starters—See Starters, Vapor Engine.... 378
Gasoline Storage Tanks—See Tanks, Gasoline Storage.... 400
Gasoline Strainers—See Strainers, Gasoline.... 388
Gasoline Tank Gauges—See Gauges, Gasoline.... 178
Gasoline Tanks—See Tanks, Emergency.... 398
Gasoline Testers—See Hydrometers.... 218
Gasoline Torches—See Torches, Gasoline.... 548
Gate Valves—See Valves, Angle.... 432
Gates, Automatic Driveway.... 174
Gauge Glass Reflectors—See Mirrors, Water Gauge 250
Gauge Glasses—See Glasses, Gauge and Lubricator.... 188
Gauge Lamps—See Lamps, Electric Dash.... 228
Gauge Lubricators—See Glasses, Gauge and Lubricator.... 188
Gauges, Air—See Gauges, Steam.... 178
Gauges, Battery.... 174
Gauges, Boiler Water Line.... 178
Gauges, Center.... 492
Gauges, Cylinder Compression.... 178
Gauges, Depth.... 492
Gauges, Drill and Wire.... 492
Gauges, Gasoline Tank.... 178
Gauges, Limit.... 492
Gauges, Plug and Ring.... 492
Gauges, Pressure—See Gauges, Steam and Air.... 178
Gauges, Ring—See Gauges, Plug and Ring.... 492
Gauges, Screw Pitch.... 492
Gauges, Steam and Air.... 178
Gauges, Surface.... 494
Gauges, Tire Pressure.... 180
Gauges, Water Circulation.... 180
Gauges, Wire—See Gauges, Drill and Wire.... 492
Gauntlets, Motorists—See Gloves, Motorists.... 188
Gear Blanks—See Gears, Blank.... 184
Gear Centering Jigs—See Jigs, Speedometer Gear Centering.... 224
Gear, Cutting—See Gears and Pinions.... 184
also Machine Work.... 246
Gear Cutting Machines—See Machines, Gear Cutting.... 512
Gear Greases—See Greases, Cup.... 190
Gear Hobbing Machines—See Machines, Gear Hobbing.... 512
Gear Pullers—See Pullers, Gear and Wheel.... 528
Gear Tooth Chamfering Machines—See Machines, Gear Tooth Chamfering.... 512
Gear Shift Levers—See Levers, Brake.... 238
Gear Shifters—See Shifters, Automatic Gear.... 350

Digitized by Google

PAGE

Gear Testing Instruments—See Instruments, Gear Testing ... 220
Gears, Automatic Starter Transmission ... 182
Gears, Blank ... 184
Gears, Cyclecar Differential ... 180
Gears, Cyclecar Steering ... 180
Gears, Cyclecar Transmission ... 182
Gears, Die Cast—See Castings, Die ... 106
Gears, Differential ... 180
Gears, Running ... 180
Gears, Steering ... 182
Gears, Transmission ... 182
Gears and Pinions, Metal ... 184
Gears and Pinions, Rawhide ... 186
Generator Tubing—See Tubing, Soft Rubber ... 428
also Tubing, Brass and Copper. 426
Generators, Acetylene ... 188
Generators, Power—See Dynamos, Battery Charging ... 156
German Silver—See Brass, Sheet ... 84
Gimps—See Bindings, Upholstery ... 66
Glass, Body—See Glass, Polished Plate ... 188
Glass Fronts—See Shields, Wind ... 348
Glass, Polished Plate ... 188
Glass Preventers—See Dimmers, or Shades, Headlight ... 150
Glass, Window—See Glass, Polished Plate ... 188
Glass, Wind Shield—See Glass, Polished Plate ... 188
Glass Wind Shield Cleaners—See Cleaners, Wind Shield ... 118
Glass, Wire ... 188
Glasses, Gauge and Lubricator ... 188
Globe Valves—See Valves, Angle ... 432
Gloves, Electrically Heated ... 188
Gloves, Heated—See Gloves, Electrically Heated ... 188
Gloves, Motorists ... 188
Glue Heaters—See Heaters, Glue ... 500
Glue Jointers—See Jointers, Glue ... 502
Goggles, Mechanics and Welders ... 494
Goggles, Motorists ... 190
Gouges, Woodworkers—See Chisels and Gouges 464
Gradometers—See Meters, Grade ... 256
Graphite, Lubricating ... 190
Gray Iron Castings—See Castings, Gray Iron ... 106
Grease Bags—See Boots, Steering Knuckle ... 78
Grease Cups—See Cups, Oil and Grease ... 146
Grease Guns—See Guns, Grease ... 198
Greases, Cup and Gear ... 190
Grinders, Chucking ... 494
Grinders, Crank Pin ... 494
Grinders, Cutter—See Grinders, Reamer and Cutter 496
Grinders, Cylinder ... 494
Grinders, Disc ... 494
Grinders, Drill ... 494
Grinders, Electric Portable—See Drills, Electric Portable ... 478
Grinders, Internal ... 494
Grinders, Piston Ring ... 494
Grinders, Plain Tool ... 496
Grinders, Reamer and Cutter ... 496
Grinders, Surface ... 496
Grinders, Swing Frame ... 496
Grinders, Universal ... 496
Grinders, Wet Tool ... 496
Grinding Compounds—See Compounds, Valve Grinding ... 134
Grinding Machines—See Grinders ... 494
Grinding Wheels—See Wheels, Grinding ... 552
Grips, Lever Handle ... 196
Grips, Non-Skid—See Chains or Grips, Non-Skid. 116
Grips, Pedal ... 196
Grips, Steering Wheel—See Covers or Grips, Steering Wheels ... 142
Grips, Throttle and Spark Lever ... 196
Guards, Horn Bulb ... 196
Guards, Leather Mud ... 198
Guards, Metal Mud ... 198
Guards, Wood Mud ... 198
Gun-metal Finish—See Treating Heat ... 420
Also Enamels, Lacquers and Finishes, Brass ... 161
Guns, Grease ... 198
Guns, Oil ... 200

H

Hack Saw Blades—See Blades, Hack Saw ... 456
Hack Saw Frames—See Frames, Hack Saw ... 490

PAGE

Hack Saw Machines—See Saws, Power Hack ... 536
Hair, Upholstery ... 200
Hair Picking Machines—See Machines, Hair Picking ... 512
Hammer Molds—See Molds, Soft Hammer ... 520
Hammers, Brass and Copper ... 498
Hammers, Chipping—See Tools, Pneumatic ... 546
Hammers, Claw ... 498
Hammers, Copper—See Hammers, Brass and Copper ... 498
Hammers, Drop—See Hammers, Power ... 498
Hammers, Hand—See Hammers, Machinists ... 498
Hammers, Machinists ... 498
Hammers, Pneumatic—See Tools, Pneumatic ... 546
Hammers, Power ... 498
Hammers, Riveting—See Tools, Pneumatic ... 546
Hammers, Steam ... 500
Hampers, Touring ... 200
Hand Clamps—See Clamps ... 466
Hand Lamps—See Lamps, Electric Hand ... 228
Hand Paste—See Soaps, Hand ... 362
Hand Pumps—See Pumps, Hand ... 316
Hand Punches—See Punches, Portable Hand ... 532
Hand Saws—See Saws, Hand ... 362
Hand Screw Machines—See Machines, Screw ... 516
Hand Soaps—See Soaps, Hand ... 362
Hand Vises—See Vises, Hand ... 548
Handles, Door ... 200
Handles, File and Tool ... 500
Handles, Starting Crank ... 202
Handles, Tool—See Handles, File and Tool ... 500
Hangers, Hat ... 202
Hangers, License—See Holders, License ... 206
also Numbers, License ... 266
Hangers, Pressed Steel Sten ... 202
Hard Rubber—See Rubber, Hard ... 338
Hardening—See Treating, Heat ... 420
Hardening, Case—See Treating, Heat ... 420
Hardening Compounds—See Compounds, Case Hardening ... 470
Hardening, Cyanide—See Treating, Heat ... 420
Hardening Furnaces—See Furnaces, Annealing and Case Hardening ... 490
Hassocks, Automobile ... 202
Hat Hangers—See Hangers, Hat ... 202
Hat Racks—See Racks, Hat ... 320
Hats, Motorists—See Caps, Motorists ... 92
Headers, Bolt—See Machines, Bolt Heading ... 508
Headlight Brackets—See Brackets, Headlight ... 82
also Brackets, Automatic Headlight ... 82
Headlight Dimmers—See Dimmers or Shades, Headlight ... 150
Headlight Shades—See Dimmers or Shades, Headlight ... 150
Headlights—See Lamps, Acetylene ... 226
Headlights, Electric ... 202
Heads, Boring ... 500
Heat Indicating Meters—See Meters, Heat Indicating ... 256
Heat Treating—See Treating, Heat ... 420
Heated Gloves—See Gloves, Electrically Heated ... 188
Heated Steering Wheels—See Wheels, Heated Steering ... 448
Heaters, Automobile ... 204
Heaters, Feed Water ... 204
Heaters, Glue ... 500
Heaters, Mixture ... 204
Heaters, Radiator ... 204
Heaters, Special Garage ... 500
Heel Rests—See Rests, Heel ... 332
High Speed Steel—See Steel, High Speed ... 386
Hinges, Cabinet ... 204
Hinges, Door ... 204
Hinges, Hood ... 204
Hobbing Machines—See Machines, Gear Hobbing 512
Hoists, Portable—See Cranes, Portable ... 472
Holders, Battery ... 206
Holders, Bouquet ... 206
Holders, Bow—See Holders, Top ... 210
Holders, Flag, Pennant and Emblem ... 206
Holders, Lathe and Planer Tool ... 500
Holders, License ... 206
Holders, Oil Can ... 208
Holders, Planer Tool—See Holders, Lathe and Planer Tool ... 500
Holders, Starting Crank ... 208
Holders, Tire ... 208
Holders, Top ... 210
Holders, Watch ... 210
Hood Covers—See Covers, Radiator ... 142
Hood Fasteners—See Fasteners, Hood ... 162
Hood Hinges—See Hinges, Hood ... 204

Digitized by Google

PAGE

Hood Lacing—See Lacing, Fabric Radiator..... 226
also Leather, Rawhide Lace..... 236
Hood Supports—See Supports, Hood..... 392
Hoods, Motor..... 210
Hooks, Snap..... 212
Horizontal Boring Machines—See Machines, Horizontal Boring..... 510
Horn Bulb Guards—See Guards, Horn Bulb.... 196
Horn Bulbs—See Bulbs, Rubber Horn..... 86
Horn Button Brackets—See Brackets, Horn Button. 82
Horn Pedals—See Pedals, Horn..... 286
Horn Reeds—See Reeds, Horn..... 326
Horn Screens—See Screens, Horn..... 340
Horn Tubes—See Tubing, Flexible..... 428
Horn Valves—See Valves, Muffler Cut-Out..... 434
Horns, Bulb..... 212
Horns, Electric..... 212
Horns, Exhaust..... 214
Horns, Mechanical..... 216
Horns, Siren..... 216
Horses, Trestles and Trucks..... 500
Hose Boxes—See Boxes, Hose..... 458
Hose Clamps—See Clamps, Hose..... 116
Hose Couplings—See Clamps, Hose..... 116
Hose, Flexible Metal—See Tubing, Flexible Metallic 428
Hose, Rubber..... 216
Hot Saws—See Saws, Hot..... 538
Housings, Pressed Steel Axle..... 216
Hub Brakes—See Brakes, Expanding and Contracting..... 82
Hub Caps—See Caps, Hub..... 92
Hub Flanges—See Flanges, Hub..... 166
Hubs, Wheel..... 218
Hydrometers..... 218
Hydraulic Testing Dynamometers—See Dynamometers, Hydraulic Testing..... 156

PAGE

Insulation—See Fibre..... 162
also Lava..... 234
also Mica..... 256
also Porcelain..... 314
also Rubber..... 338
Intake Manifolds—See Manifolds, Intake..... 250
Intensifiers, Spark—See Gaps, Spark..... 172
Internal Grinders—See Grinders, Internal..... 494
Iron—See Steel..... 380
Iron Castings—See Castings..... 106
Iron Cement—See Cement, Cast Iron..... 112
Iron, Dealers in—See Steel, Dealers in..... 378
Iron Lined Brass Tubing—See Tubing, Iron Lined 428
Iron Pipe—See Pipe, Wrought Iron..... 290
Iron Rivets—See Rivets, Iron..... 336
Iron Washers—See Washers, Iron..... 442
Irons, Body or Top..... 220
Irons, Slat..... 220
Irons, Tire—See Tools, Tire..... 412
Irons, Tuyere..... 502

J

Jack Shafts—See Countershafts..... 138
Jack Stirrups—See Stirrups, Jack Handle..... 388
Jacks, Lifting..... 220
Jacks, Special..... 222
Jacks, Tire Saving..... 222
Jackshafts, Cyclecar—See Axles, Cyclecar..... 50
Jars, Rubber Battery..... 224
Jigs, Speedometer Gear Centering..... 224
Jobbers, Supply..... 224
Joint Boots—See Boots, Steering Knuckle..... 78
Jointers, Glue..... 502
Joints, Ball..... 224
Joints, Universal..... 224
Jute Webbing—See Webbing, Jute..... 444

I

Ignition Cable—See Wire, Insulated..... 450
Ignition Dynamos—See Magnetos, Ignition..... 250
Ignition Switches—See Switches, Ignition..... 394
Ignition Systems, Single Spark—See Systems, Single Spark Ignition..... 396
Ignition Timers—See Timers, Ignition..... 404
Ignition Wire—See Wire, Insulated..... 450
Imitation Leather—See Leather, Artificial..... 234
Indicating Meters—See Meters, Heat Indicating.. 256
Indicators, Automobile Speed—See Speedometers 364
Indicators, Compression—See Gauges, Cylinder Compression..... 178
Indicators, Distance—See Meters, Distance..... 256
Indicators, Fuel Level—See Gauges, Gasoline Tank. 178
Indicators, Grade—See Meters, Grade..... 256
Indicators, Spark—See Gaps, Spark..... 172
Indicators, Speed..... 500
Indicators, Tail Light..... 218
Indicators, Tank—See Gauges, Gasoline Tank.... 178
Indicators, Tire Pressure—See Gauges, Tire Pressure..... 180
Indicators, Water Circulation—See Gauges, Water Circulation..... 180
Inflators, Tire—See Pumps..... 316
also Tanks..... 402
Initials—See Monograms, Ornamental Metal..... 260
Injectors, Boiler Feeding..... 218
Injectors, Grease—See Guns, Grease..... 198
Injectors, Water—See Moisteners, Air or Mixture.. 260
Inner Tire Shoes—See Shoes, Inner Tire..... 352
Inner Tube Bags—See Cases, Tire..... 98
Inner Tubes—See Tubes, Inner..... 424
Inserted Tooth Saws—See Saws, Inserted Tooth 538
Inserts, Spring Leaf—See Strips, Spring Leaf Lubricating..... 392
Inspection Lamps—See Lamps, Electric Hand.. 228
Instruments, Gas Analysis..... 218
Instruments, Gear Testing..... 220
Instruments, Motor Testing..... 220
Instruments, Rubber Testing..... 220
Instruments, Steel Testing..... 220
Insulated Wire—See Wire, Insulated..... 450
Insulating Composition—See Composition, Insulating..... 126
Insulating Tape—See Tape, Insulating and Tire.. 402

K

Kerosene Burners—See Burners, Gasoline and Kerosene..... 90
Kerosene Carbureters—See Carbureters, Kerosene 96
Kerosene Furnaces—See Torches, Kerosene..... 548
Kerosene Torches—See Torches, Kerosene..... 548
Kettles, Potash—See Kettles, Soda and Potash.. 502
Kettles, Soda and Potash..... 502
Key Seaters—See Machines, Key Seating..... 512
Key Seating Machines—See Machines, Key Seating..... 512
Keys, Acetylene Gas Tank..... 224
Keys, Machine..... 502
Keys, Split—See Pins, Cotter..... 288
Kick Switches—See Switches, Ignition..... 394
Kits, Tire Repair..... 226
Knuckle Cases—See Boots, Steering Knuckle.... 78
Knuckles, Steering—See Forgings, Drop..... 168
Knurls..... 502

L

Lace, Coach..... 226
Lace Leather—See Leather, Rawhide Lace..... 236
Lacing, Fabric Radiator..... 226
Lacing, Hood—See Lacing, Fabric Radiator..... 226
also Leather, Rawhide Lace..... 236
Lacing, Radiator—See Lacing, Fabric Radiator.... 226
also Leather, Rawhide Lace.... 236
Lacquers, Lamp—See Enamels, Lacquers and Finishes, Brass..... 160
Lacquers, Metal..... 502

Digitized by Google

PAGE

Lag Screws—See Screws, Coach..... 340
Lamp Adapters—See Adapters, Electric Lamp.... 49
Lamp Brackets—See Brackets, Side and Tail Lamp. 82
Lamp Bulb Boxes—See Cases, Extra Lamp Bulb.. 96
Lamp Bulb Cases—See Cases, Extra Lamp Bulb.. 96
Lamp Bulbs—See Lamps, Miniature Tungsten.... 232
Lamp Burners—See Burners, Acetylene Lamp.. 88
also Connectors, Acetylene Lamp 136
Lamp Connectors—See Connectors, Electric Lamp 138
also Connectors, Acetylene Lamp 136
also Tubing, Soft Rubber..... 428
Lamp Covers—See Covers, Lamp..... 140
Lamp Enamels—See Enamels, Lacquers and Finishes, Brass..... 160
Lamp Lighters—See Lighters, Acetylene Lamp.. 238
also Lighters, Oil Lamp..... 240
Lamp Numbers—See Numbers, Lamp..... 266
Lamp Reflectors—See Reflectors, Mirror..... 326
Lamp Sockets—See Sockets, Electric Lamp..... 364
Lamp Tubing—See Tubing, Soft Rubber..... 428
Lamp Wicks—See Wicks, Lamp..... 450
Lamps, Dash—See Lamps, Electric Dash..... 228
Lamps, Electric Dash or Gauge..... 228
Lamps, Electric Hand or Inspection..... 228
Lamps, Electric Gauge—See Lamps, Electric Dash or Gauge..... 228
Lamps, Electric Inspection—See Lamps, Electric, Hand or Inspection..... 228
Lamps, Electric Side and Tail..... 230
Lamps, Electric Tail—See Lamps, Electric Side or Tail..... 230
Lamps, Gauge—See Lamps, Electric Dash or Gauge..... 228
Lamps, Hand—See Lamps, Electric Hand..... 228
Lamps, Inspection—See Lamps, Electric Hand or Inspection..... 228
Lamps, Miniature Tungsten..... 232
Lamps, Oil Side and Tail..... 232
Lamps, Side—See Lamps, Electric Side..... 230
also Lamps, Oil Side..... 232
Lamps, Tail—See Lamps, Electric Side and Tail 230
also Lamps, Oil Side and Tail.... 232
Lamps, Tungsten—See Lamps, Miniature Tungsten..... 232
Lamps, Wire..... 234
Lamps or Headlights, Acetylene..... 226
Lamps or Headlights, Electric—See Headlights, Electric..... 202
Lap Robes—See Robes, Automobile..... 336
Lathe Chucks—See Chucks, Lathe..... 464
Lathe Dogs—See Dogs, Lathe..... 476
Lathe Tool Holders—See Holders, Lathe and Planer Tools..... 500
Lathe Tools—See Tools, Lathe..... 546
Lathes, Bench or Precision..... 502
Lathes, Buffing—See Machines, Buffing..... 510
Lathes, Crank Pin..... 502
Lathes, Dealers in—See Machinery, Dealers in .. 506
Lathes, Engine..... 504
Lathes, Forming..... 504
Lathes, Patternmakers—See Lathes, Woodworking..... 506
Lathes, Polishing—See Machines, Buffing and Polishing..... 510
Lathes, Precision—See Lathes, Bench or Precision 502
Lathes, Turret..... 504
Lathes, Woodworking..... 506
Lava..... 234
Lead Hammer Molds—See Molds, Soft Hammer.. 520
Leaf Springs—See Springs, Leaf..... 366
Leather, Artificial..... 234
Leather, Friction..... 234
Leather, Imitation—See Leather, Artificial..... 234
Leather, Natural..... 236
Leather, Rawhide Lace..... 236
Leather Belting—See Belting, Leather..... 64
Leather Coats—See Clothing, Motorists..... 122
Leather Dashes—See Dashes, Leather..... 150
Leather Dressing—See Dressing, Leather..... 152
Leather Fillets—See Fillets, Wood..... 486
Leather Measuring Machines—See Machines, Leather Measuring..... 512
Leather Mud Guards—See Guards, Leather Mud 198
Leather Splitting Machines—See Machines, Leather Splitting..... 512
Leather Straps—See Straps, Leather..... 390
Leather Tires—See Tires, Leather..... 406
Leather Tops—See Tops, Automobile..... 414
Leather Washers—See Washers, Leather..... 442
Leggings, Motorists..... 238
Letters, Pattern..... 506
Letters, Steel—See Stamps, Steel..... 542
Levels, Spirit..... 506

PAGE

Lever Handle Grips—See Grips, Lever Handle.. 196
Lever Shears—See Shears, Lever..... 542
Lever Engine Starters—See Starters, Manual or Pedal or Lever Engine..... 378
Lever Grips—See Grips, Throttle and Spark..... 196
Levers, Brake and Gear Shift..... 238
Levers, Gear Shift—See Levers, Brake..... 238
Levers, Speed Change—See Levers, Brake..... 238
License Holders—See Holders, License..... 206
License Numbers—See Numbers, License..... 266
Lifters, One Man Top..... 238
Lifters, Tire—See Tools, Tire..... 412
Lifting Jacks—See Jacks, Lifting..... 220
Lifting Tools—See Tools, Electro Magnetic Lifting 410
Light Stands—See Lights, Wash Stand..... 240
Light Switches—See Switches, Light..... 394
Lighters, Acetylene Lamp..... 238
Lighters, Electric Cigar..... 240
Lighters, Oil Lamp..... 240
Lighting Batteries—See Batteries, Storage..... 58
Lighting Dynamos—See Dynamos, Electric Lighting..... 156
Lighting Systems—See Systems, Electric Lighting..... 396
Lights, Electric Dome..... 240
Lights, Electric Head—See Headlights, Electric. 202
Lights, Gauge—See Lamps, Electric Dash..... 228
Lights, Wash Stand..... 240
Limit Gauges—See Gauges, Limit..... 492
Limousine Lights—See Lights, Electric Dome.... 240
Limousine Telephones—See Telephones, Limousine 402
Limousine Ventilators—See Ventilators, Limousine and Fore-door..... 438
Limousine Watches—See Watches, Limousine.. 444
Liners—See Shims, Brass and Copper..... 444
Lining, Body or Frame..... 240
Lining, Brake—See Banding, Brake..... 54
also Leather, Friction..... 234
also Fibre, Hard..... 162
Linoleum..... 240
Lock Nuts—See Nuts, Lock..... 268
Lock Switches—See Switches, Lock..... 394
Lock Valves—See Valves, Gasoline Lock..... 432
Lock Washers—See Nuts, Lock..... 268
Lockers, Metal Clothes..... 506
Locks, Automobile..... 242
Locks, Battery Box—See Locks, Cabinet and Pad. 242
also Catches, Spring..... 112
Locks, Cabinet and Pad..... 242
Locks, Door..... 242
Locks, Tool Box—See Locks, Cabinet and Pad.... 242
also Catches, Spring..... 112
Loops, Brass Snap and Strap..... 242
Looseners, Tire—See Tools, Tire..... 412
Low Water Alarms—See Columns, Water..... 126
Lubricants—See Greases, Cup and Gear..... 190
also Oils..... 268
Lubricants, Cutting..... 506
Lubricating Strips, Spring—See Strips, Spring Leaf Lubricating..... 392
Lubricator Belts—See Belts, Endless Fabric.... 64
also Belts, Spiral Wire..... 64
Lubricator Wicking—See Wicking, Felt Lubricator..... 450
Lubricators, Hand..... 244
Lubricators, Mechanical..... 244
Lubricators, Oil and Grease Cup—See Cups, Oil and Grease..... 146
Lubricators, Pressure..... 244
Luggage Carriers—See Racks, Trunk..... 320
Lugs, Tire..... 244
Lumber, Automobile..... 244
Lunch Boxes—See Hampers, Touring..... 200

M

Machine Bolts—See Bolts, Machine..... 78
Machine Keys—See Keys, Machine..... 502
Machine Screw Taps—See Taps and Dies..... 546
Machine Screws—See Screws, Machine..... 342
Machine Shop Supplies—See Supplies, Machine Shop..... 544
Machine Work, to Order..... 246

Digitized by Google

PAGE

Machined Pistons—See Pistons, Finished and Machined ... 290
Machinery, Dealers in ... 506
Machinery, Sand Mixing and Conveying ... 508
Machines, Abrasive Metal Cutting ... 508
Machines, Autogenous Welding ... 508
Machines, Automatic Screw — See Machines, Screw ... 516
Machines, Band Sawing—See Saws, Band ... 536
Machines, Beading—See Machines, Crimping and Beading ... 512
Machines, Blue Printing ... 508
Machines, Bolt Heading ... 508
Machines, Bolt Pointing ... 508
Machines, Bolt Threading ... 510
Machines, Boring—See Machines, Horizontal Boring ... 510
also Machines, Vertical Boring 510
Machines, Broaching—See Presses, Broaching .. 526
Machines, Buffing and Polishing ... 510
Machines, Cam Cutting ... 510
Machines, Carbon Removing—See Machines, Motor Decarbonizing ... 514
Machines, Circular Sawing—See Saws, Circular .. 536
Machines, Cold Saw—See Saws, Cold ... 536
Machines, Core Making ... 510
Machines, Core Wire Straightening and Cutting 510
Machines, Crimping and Beading ... 512
Machines, Cutting-Off ... 512
also Saws, Cold ... 536
Machines, Drilling—See Drills ... 478
Machines, Electric Welding ... 512
Machines, Filing ... 512
Machines, Gear Cutting ... 512
Machines, Gear Hobbing ... 512
Machines, Gear Tooth Chamfering ... 512
Machines, Hack Saw—See Saws, Power Hack .. 536
Machines, Hair Picking ... 512
Machines, Hand Screw ... 516
Machines, Horizontal Boring ... 510
Machines, Key Seating ... 512
Machines, Leather Measuring ... 512
Machines, Leather Splitting ... 512
Machines, Marking ... 514
Machines, Milling ... 514
Machines, Mortising—See Machines, Wood Mortising ... 518
Machines, Motor Decarbonizing ... 514
Machines, Nut Tapping ... 514
Machines, Piston Ring ... 514
Machines, Polishing—See Machines, Buffing and Polishing ... 510
Machines, Profiling ... 516
Machines, Riveting ... 516
Machines, Sand Blast ... 516
Machines, Sanding—See Sanders, Wood ... 534
Machines, Saw Sharpening ... 516
Machines, Screw ... 516
Machines, Screw Slotting—See Slotters, Screw .. 540
Machines, Spring Coiling ... 516
Machines, Spring Testing ... 516
Machines, Tapping ... 516
Machines, Tenoning—See Machines, Wood Mortising ... 518
Machines, Tire Bandage Wrapping ... 518
Machines, Upholstery Button ... 518
Machines, Upholstery Tufting ... 518
Machines, Valve Seating ... 518
Machines, Vertical Boring ... 510
Machines, Wire Spoke Swaging ... 518
Machines, Wood Bending ... 518
Machines, Wood Boring ... 518
Machines, Wood Mortising and Tenoning ... 518
Machines, Wood Tenoning—See Machines, Wood Mortising ... 518
Machinists Hammers—See Hammers, Machinists .. 498
Machinists Squares—See Squares, Machinists ... 542
Magnetic Chucks—See Chucks, Magnetic ... 466
Magnetic Lifting Tools—See Tools, Electro Magnetic Lifting ... 410
Magneto Couplings—See Couplings, Magneto ... 140
Magneto Covers—See Covers, Leather Magneto 140
Magnetos, Ignition ... 250
Magnets, Permanent ... 250
Malleable Castings—See Castings, Malleable Iron 108
Mallets, Wooden ... 518
Mandrels, Expanding ... 518
Manganese Steel—See Steel, Manganese ... 384
Manifold Registers—See Registers, Autographic and Manifold ... 534
Manifolds, Intake and Exhaust ... 250
Manual Engine Starters—See Starters, Manual or Pedal or Lever Engine ... 378

PAGE

Manufacturers Agents ... 252
Maps, Road ... 252
Marking Machines—See Machines, Marking ... 514
Master Vibrators—See Coils, Spark ... 126
Mat Binding—See Binding, Mat and Carpet ... 66
Mats, Carpet—See Carpet, Coach ... 96
Mats, Cocoa ... 252
Mats, Linoleum—See Linoleum ... 240
Mats, Rubber ... 252
Mats, Steel ... 252
Mats, Step and Running Board ... 252
Matting, Aluminum ... 252
Measuring Machines—See Machines, Leather Measuring ... 512
Measuring Tapes—See Tapes, Measuring ... 546
Mechanical Bells—See Bells, Mechanical ... 62
Mechanical Cleaners—See Cleaners, Glass Wind Shield ... 118
Mechanical Engine Starters—See Starters, Mechanical or Spring Engine ... 378
Mechanical Horns—See Horns, Mechanical ... 216
Mechanics Goggles—See Goggles, Mechanics and Welders ... 494
Medical Emergency Cases—See Cases, Medical .. 96
Mercury Rectifiers—See Rectifiers, Alternating Current ... 326
Metal Bodies—See Bodies, Metal ... 66
Metal Cement—See Cement, Cast Iron ... 112
Metal Dashes—See Dashes, Metal ... 150
Metal Floats—See Floats, Metal ... 168
Metal Gaskets—See Gaskets, Metallic ... 174
Metal Gears—See Gears, Metal ... 184
Metal Hose—See Tubing, Flexible Metallic ... 428
Metal Lacquers—See Lacquers, Metal ... 502
Metal Lockers—See Lockers, Metal ... 506
Metal Mud Guards—See Guards, Metal Mud ... 198
Metal Planers—See Planers, Metal ... 520
Metal Polishes—See Polishes, Metal ... 306
Metal Shapers—See Shapers, Metal ... 540
Metal Snips—See Snips, Metal ... 542
Metals, Bearing ... 252
Metals, Dealers in—See Steel, Dealers in ... 378
Metals, Perforated ... 256
Meters, Ampere—See Ammeters, Standard ... 50
also Gauges, Battery ... 174
Meters, Cut ... 518
Meters, Cylinder Compression—See Gauges, Cylinder Compression ... 178
Meters, Distance Recording ... 256
Meters, Gasoline or Oil ... 518
Meters, Grade ... 256
Meters, Heat Indicating ... 256
Meters, Speed—See Speedometers ... 364
Mica ... 256
Micrometers ... 520
Mileage Indicators—See Meters, Distance ... 256
Milling Cutters—See Cutters, Milling ... 474
Milling Machine Chucks—See Chucks, Milling Machine ... 466
Milling Machine Vises—See Vises, Milling Machine 550
Milling Machines—See Machines, Milling ... 514
Mills, Boring—See Machines, Boring ... 510
Mineral Cleaners—See Cleaners, Mineral ... 468
Miniature Tungsten Lamps—See Lamps, Miniature Tungsten ... 232
Mirror Reflectors—See Reflectors, Mirror Lamp .. 326
Mirrors, Adjustable Dashboard ... 258
Mirrors, Water Gauge ... 258
Mitre Boxes—See Boxes, Mitre ... 458
Mixers, Economizers or Agitators, Fuel ... 258
Mixers, Rubber Cement ... 520
Mixers, Sand—See Machinery, Sand Mixing and Conveying ... 508
Mixing Valves—See Vaporizers ... 436
Mixture Heaters—See Heaters, Mixture ... 204
Mixture Moisteners—See Moisteners, Air or Mixture ... 260
Mohair—See Cloth, Mohair ... 120
Mohair Top Dressing—See Dressing, Mohair Top 154
Moisteners, Air or Mixture ... 260
Molders Shovels—See Shovels, Molders ... 540
Molders Tools—See Tools, Molders ... 546
Molds, Soft Hammer ... 520
Molds and Cores, Tire Vulcanizing ... 520
Monkey Wrenches—See Wrenches, Nut and Bolt 552
Monograms, Ornamental Metal ... 260
Mortising Machines—See Machines, Wood Mortising ... 518
Moss, Upholstery ... 262
Motion Recorders—See Recorders, Vehicle ... 326
Motor Brushes—See Brushes, Carbon Motor ... 84
Motor Commutators—See Commutators, Electric Motor ... 126

Digitized by Google

PAGE

Motor Controllers—See Controllers, Electric Motor 138
Motor Decarbonizing Machines—See Machines, Motor Decarbonizing 514
Motor Generators—See Dynamos, Battery Charging 156
Motor Hoods—See Hoods, Motor 210
Motor Repair Stands—See Stands, Motor Repair 544
Motor Testing Instruments—See Instruments Motor Testing 220
Motors, Electric Automobile 262
Motors, Gasoline Automobile 262
Motors, Gasoline Cyclecar 262
Motors, Steam—See Engines, Steam 160
Moulding, Body—See Moulding, Steel 264
also Moulding, Brass 264
Moulding, Brass 264
Moulding, Running Board 264
Moulding, Steel 264
Movement Recorders—See Recorders, Vehicle 326
Mud Guards—See Guards, Mud 198
Muffler Cut-Out Pedals—See Pedals, Horn 286
Muffler Cut-Outs—See Valves, Muffler Cut-Out 434
Muffler Paints—See Paints, Exhaust Pipe 280
Mufflers, Exhaust 264
Mufflers, Throat 266
Multiple Spindle Drills—See Drills, Multiple Spindle 478

N

Nails, Upholstery—See Tacks, Upholstery 396
Name Plates—See Plates, Name 290
Natural Leather—See Leather, Natural 236
Needle Valves—See Valves, Needle 434
Nickel Steel—See Steel, Nickel 384
Nippers—See Pliers, Combination 522
Nipples, Pipe—See Fittings, Pipe 164
Nipples, Tire Pump—See Connections, Tire Pump 136
Non-Freezing Compounds—See Compounds, Anti-Freezing 128
Non-Skids—See Bands, Non-Skid 56
also Chains or Grips 116
also Treads, Tire 418
Number Holders—See Holders, License 206
Numbers, Lamp 266
Numbers, License 266
Numbers, Pattern—See Letters, Pattern 506
Numbers, Steel—See Stamps, Steel 542
Nurls—See Knurls 502
Nut Tapping Machines—See Machines, Nut Tapping 514
Nut Wrenches—See Wrenches, Nut and Bolt 552
Nuts, Castellated 266
Nuts, Finished and Case Hardened 266
Nuts, Thumb or Wing 268
Nuts and Washers, Lock 268

O

Odometers—See Meters, Distance 256
Oil Can Holders—See Holders, Oil Can 208
Oil Cans—See Cans, Oiling 90
also Guns, Oil 200
Oil Cups—See Cups, Oil and Grease 146
Oil Guns—See Guns, Oil 200
Oil Hole Covers—See Covers, Oil Hole 142
Oil Lamp Lighters—See Lighters, Oil Lamp 240
Oil Lamps—See Lamps, Oil 232
Oil Meters—See Meters, Gasoline or Oil 518
Oil Pumps—See Lubricators 244
Oil Retaining Rings—See Washers, Felt 440
Oil Separators—See Separators, Oil 538
Oil Stones—See Stones, Oil 388
Oil Tempering—See Treating, Heat 420
Oilers, Spring Leaf—See Cups, Spring Leaf Oiling 148
also Strips, Spring Leaf Lubricating 392
Oilless Bearings—See Bearings, Oilless 456
Oils 268
Oils, Cutting—See Lubricants, Cutting 506

PAGE

Oldham Couplings—See Couplings, Magneto 140
One Man Top Lifters—See Lifters, One Man Top 238
Open End Wrenches—See Wrenches Nut and Bolt 552
Openers, Curtain—See Fittings, Curtain Opening 164
Ornaments, Radiator 266
Ornaments, Transfer—See Transfers, Decalcomania 418
Ovens, Core Baking 520
Ovens, Enameling 520
Oxy-Acetylene Welding—See Welding, Autogenous 444
Oxy-Acetylene Welding Machines—See Machines, Autogenous Welding 508
Oxygen Cylinder Cleaning Apparatus—See Machines, Motor Decarbonizing 514
Oxygen Tanks—See Tanks, Oxygen 402

P

Packing, Asbestos and Fibrous 276
Packing, Candle Wick—See Wicking, Candle 452
Packing, Metallic—See Gaskets, Metallic 174
Packing, Rubber 276
Pad Locks—See Locks, Cabinet and Pad 242
Pads, License—See Numbers, License 266
Pails—See Buckets 84
Pails, Folding—See Buckets, Collapsible 84
Paint Brushes—See Brushes, Paint 460
Paint Fillers—See Fillers, Paint 164
Paint Removers—See Removers, Paint and Varnish 328
Paints, Aluminum and Bronze 278
Paints, Enamel 280
Paints, Exhaust Pipe and Muffler 280
Paints, Rim 280
Paints, Rubber 282
Paints and Colors 278
Panels, Charging 282
Panels, Wood 284
Pans, Drip 284
Pans, Dust 284
Pans, Floor—See Pans, Drip 284
Pans, Garage—See Pans, Drip 284
Paper, Emery and Sand 520
Paper, Friction—See Frictions, Fibre 170
Paper, Sand—See Paper, Emery and Sand 520
Paper Shipping Covers—See Covers, Paper Shipping 142
Parting Compounds—See Facings, Foundry 486
Partings, Foundry—See Facings, Foundry 486
Paste, Hand—See Soaps, Hand 362
Paste, Polishing—See Polishes, Metal 306
Paste, Soldering—See Flux, Soldering 488
Paste, Trimmers 284
Patches, Tire Repair 284
Patching Cement—See Cement, Tire Repair 114
Pattern Fillets—See Fillets, Wood 486
Pattern Letters—See Letters, Pattern 506
Pattern Numbers—See Letters, Pattern 506
Patternmakers Dowels—See Dowels, Patternmakers 476
Patternmakers Lathes—See Lathes, Woodworking 506
Patternmakers Vises—See Vises, Patternmakers 550
Patterns, Automobile 286
Pedal Engine Starters—See Starters, Manual or Pedal or Lever Engine 378
Pedal Grips—See Grips, Pedal 196
Pedals, Horn and Cut-Out 286
Pedals, Ratchet 288
Pedals, Special Accelerator 288
Pennant Holders—See Holders, Flag, Pennant and Emblem 206
Pennants—See Flags, Pennants and Emblems 166
Perforated Metals—See Metals, Perforated 256
Pet Cocks—See Cocks 124
Picking Machines—See Machines, Hair Picking 512
Pin Vises—See Vises, Pin 550
Pinions—See Gears 184
Pins, Cotter 288
Pins, Escutcheon 288
Pins, Piston 288
Pins, Taper 288
Pipe, Wrought Iron or Steel 290
Pipe Coils—See Coils, Pipe 126
Pipe Cutters—See Cutters, Pipe 474
Pipe Fittings—See Fittings, Pipe 164
Pipe Vises—See Vises, Pipe 550

Digitized by Google

PAGE

Pipe Wrenches—See Wrenches, Pipe..... 556
Piping, Exhaust and Intake—See Manifolds, Intake..... 250
Piston Pins—See Pins, Piston..... 288
Piston Ring Grinders—See Grinders, Piston Ring 494
Piston Ring Machines—See Machines, Piston Ring..... 514
Piston Ring Tools—See Tools, Piston Ring..... 410
Piston Rings—See Rings, Piston..... 334
Pistons, Finished and Machined..... 290
Planer Chucks—See Chucks, Planer..... 466
Planer Tool Holders—See Holders, Lathe and Planer Tool..... 500
Planer Tools—See Tools, Lathe and Planer..... 546
Planer Vises—See Vises, Planer..... 552
Planers, Metal..... 520
Planers, Wood..... 520
Planes, Woodworkers..... 522
Planetary Gears—See Gears, Transmission..... 182
Plate Glass—See Glass, Polished Plate..... 188
Plates, Foundry Rapping..... 522
Plates, Name..... 290
Plates, Screw—See Taps and Dies..... 546
Plating, Brass..... 292
Plating Compounds—See Compounds, Chemical Plating..... 130
Platinum..... 292
Pliers, Combination..... 522
Pliers, Gas—See Pliers, Combination..... 522
Pliers, Tire Repair..... 292
Plug Brushes—See Brushes, Spark Plug..... 84
Plug Cases—See Cases, Spark Plug..... 96
Plug Gauges—See Gauges, Plug and Ring..... 492
Plugs, Charging..... 292
Plugs, Spark..... 292
Plugs, Tire Repair..... 302
Plumb Bobs—See Bobs, Plumb..... 458
Pneumatic Chucks—See Chucks, Pneumatic..... 466
Pneumatic Drills—See Tools, Pneumatic..... 546
Pneumatic Hammers—See Tools, Pneumatic..... 546
Pneumatic Tires—See Tires..... 406
Pneumatic Tools—See Tools, Pneumatic..... 546
Pneumatic Wheels—See Wheels, Special..... 448
Pocket Meters—See Gauges, Battery..... 174
Pockets, Truck Stake..... 302
Pointers, Bolt—See Machines, Bolt Pointing..... 508
Points, Sparking..... 302
Polishers, Electric Portable—See Drills, Electric Portable..... 478
Polishes, Automobile Body..... 302
Polishes, Metal..... 306
Polishing Cloths—See Wipers..... 450
Polishing Compounds—See Compounds, Buffing and Polishing..... 468
Polishing Machines—See Machines, Buffing..... 510
Polishing Wheels—See Wheels, Buffing and Polishing..... 552
Poppet Valves—See Valves, Gas Engine..... 432
Porcelain..... 314
Portable Buffers—See Drills, Electric Portable 478
Portable Buildings—See Garages..... 172
Portable Cranes—See Cranes, Portable..... 472
Portable Drills—See Drills, Electric Portable..... 478
Portable Electric Lamps—See Lamps, Electric Hand or Inspection..... 228
Portable Garages—See Garages, Portable..... 172
Portable Grinders—See Drills, Electric Portable 478
Portable Hand Punches—See Punches, Portable Hand..... 532
Portable Polishers—See Drills, Electric Portable. 478
Portable Vises—See Vises, Special Portable..... 552
Portable Vulcanizers—See Vulcanizers, Portable 438
Post Drills—See Drills, Post..... 478
Posts, Tool..... 526
Potash Kettles—See Kettles, Soda and Potash..... 502
Power Hack Saws—See Saws, Power Hack..... 536
Power Hammers—See Hammers, Power..... 498
Power Presses—See Presses, Power..... 526
Precision Lathes—See Lathes, Bench..... 502
Pressed Steel Axle Housings—See Housings, Pressed Steel..... 216
Pressed Steel Brake Drums—See Drums, Brake..... 156
Pressed Steel Frames—See Frames, Pressed Steel 170
Pressed Steel Hub Flanges—See Flanges, Hub..... 166
Pressed Steel Parts—See Stampings..... 370
Pressed Steel Step Hangers—See Hangers, Pressed Steel Step..... 202
Pressed Steel Wheels—See Wheels, Pressed Steel. 446
Presses, Arbor..... 526
Presses, Bench Straightening..... 526
Presses, Broaching..... 526
Presses, Dealers in—See Machinery, Dealers in..... 506
Presses, Forcing—See Presses, Arbor..... 526

PAGE

Presses, Power..... 526
Pressure Lubricators—See Lubricators, Pressure 244
Pressure Regulators—See Regulators, Acetylene Pressure or Reducing Valve..... 328
Also Regulators, Tank Pressure..... 328
Preventers, Glass—See Dimmers or Shades, Headlight..... 150
Prick Punches—See Punches, Centre and Prick..... 530
Primary Cable—See Wire, Insulated..... 450
Primer Bushings—See Bushings, Starter or Primer Attaching..... 90
Primers, Gasoline Engine..... 314
Priming Compounds—See Solution, Priming..... 364
Priming Cups—See Cups, Spring Key Priming..... 148
Priming Solution—See Solution, Priming..... 364
Processes, Rust Proofing—See Galvanizing..... 170
Products, Screw Machine—See Screw Machine Products..... 342
Profiling Machines—See Machines, Profiling..... 516
Propeller Shafts—See Shafts, Propeller..... 348
Props, Car—See Jacks, Tire Saving..... 222
Protectors, Eye—See Goggles, Mechanics and Welders..... 494
Protectors, Sleeve..... 314
Protectors, Tire—See Treads, Detachable..... 418
also Shoes, Inner..... 352
Pullers, Cotter Pin..... 526
Pullers, Gear and Wheel..... 528
Pulleys—See Sheaves and Pulleys..... 348
Pump Connections—See Connections, Tire Pump 136
Pump Couplings—See Couplings, Magneto..... 140
Pump Washers—See Washers, Leather..... 442
Pumps, Circulating—See Pumps, Water Circulating 320
Pumps, Engine Driven Tire..... 316
Pumps, Garage Tire—See Pumps and Air Compressors..... 528
Pumps, Gasoline—See Tanks, Gas Storage..... 400
Pumps, Hand Tire..... 316
Pumps, Oil—See Lubricators..... 146
Pumps, Steam Air..... 318
Pumps, Steam Boiler Feed..... 320
Pumps, Tire—See Pumps, Hand Tire..... 316
also Pumps, Engine Driven..... 316
also Pumps and Air Compressors..... 528
Pumps, Water Circulating..... 320
Pumps and Air Compressors..... 528
Punches, Arch and Washer..... 530
Punches, Centre and Prick..... 530
Punches, Dealers in—See Machinery, Dealers in 506
Punches, Portable Hand..... 532
Punches, Prick—See Punches, Centre and Prick..... 530
Punches, Washer—See Punches, Arch and Washer 530
Punches and Shears..... 530
Puncture Compounds—See Compounds, Puncture Sealing..... 130
Purifiers, Acetylene Gas..... 320
Push Button Brackets—See Brackets, Horn, Button 82
Push Button Switches—See Switches, Light..... 394
Pushes, Foot..... 320
Putty..... 320
Putty, Tire—See Compounds, Tire Repair..... 132
Pyrometers..... 532

Q

Quadrants—See Levers, Brake..... 238
Quick Detachable Rims—See Rims, Quick Detachable..... 332

R

Races, Ball—See Cups, Ball..... 144
Racks, Drill..... 532
Racks, Hat..... 320
Racks, Metal Tool and Stock..... 532
Racks, Robe—See Rails, Robe..... 322
Racks, Stock—See Racks, Metal Tool..... 532
Racks, Tool—See Racks, Metal Tool..... 532
Racks, Trunk..... 320
Radial Drills—See Drills, Radial..... 478
Radiator Caps—See Caps, Brass Radiator..... 92
also Caps, Rubber Radiator..... 92

Digitized by Google

PAGE

Radiator Cleaning Compounds—See Compounds, Radiator ... 132
Radiator Covers—See Covers, Radiator ... 142
Radiator Discs—See Discs, Radiator ... 150
Radiator Fans—See Fans, Radiator ... 160
Radiator Heaters—See Heaters, Radiator ... 204
Radiator Lacing—See Lacing, Fabric Radiator ... 226
also Leather, Rawhide Lace ... 236
Radiator Ornaments—See Ornaments, Radiator 266
Radiator Repair Cement—See Cement, Radiator Repair ... 112
Radiator Signs—See Monograms, Ornamental Metal ... 260
Radiator Thermometers—See Meters, Heat Indicating ... 256
Radiators, Water Cooling ... 322
Rails, Robe ... 322
Rain Coats—See Clothing, Motorists ... 122
Rapping Plates—See Plates, Foundry Rapping ... 522
Rasps—See Files and Rasps ... 486
Ratchet Drills—See Drills, Ratchet ... 480
Ratchet Pedals—See Pedals, Ratchet ... 288
Rattlers—See Barrels, Tumbling ... 455
Rawhide Gears—See Gears, Rawhide ... 186
Reamer Grinders—See Grinders, Reamer ... 496
Reamer Wrenches—See Wrenches, Tap and Reamer ... 556
Reamers, Standard and Adjustable ... 532
Reamers, Valve Stem Guide ... 534
Rear Light Indicators—See Indicators, Tail Light ... 218
Rear Traffic Signals—See Signals, Rear Traffic ... 356
Rebound Straps—See Straps, Rebound ... 390
Recorders, Time—See Registers, Autographic and Manifold ... 534
Recorders, Vehicle Movement ... 326
Rectifiers, Alternating Current ... 326
Reducing Valve Regulators—See Regulators, Acetylene Pressure ... 328
Reeds, Horn ... 326
Reels, Top Cable—See Cables, Top ... 90
Reflectors, Gauge Glass—See Mirrors, Water Gauge ... 258
Reflectors, Mirror Lamp ... 326
Registers, Autographic and Manifold ... 534
Regrinding of Ball Bearings ... 62
Regulators, Acetylene Pressure or Reducing Valve 328
Regulators, Fuel Feed ... 328
Regulators, Tank Pressure ... 328
Regulators, Water Level ... 328
Regulators, Window ... 328
Relief Cocks—See Cocks ... 124
also Cups, Spring Key ... 148
Reliners—See Shoes, Inner Tire ... 352
Removable Rims—See Rims, Removable ... 332
Removers, Carbon ... 328
Removers, Paint and Varnish ... 328
Removers, Piston Ring—See Tools, Piston Ring 410
Removers, Tire—See Tools, Tire ... 412
Repair Clamps—See Clamps, Spring Repair ... 116
Repair Pliers—See Pliers, Tire Repair ... 292
Repair Trucks—See Trucks, Repair ... 422
Repairers, Broken Casting—See Braziers ... 84
Reserve Cocks—See Valves, Two Way Tank ... 436
Reserve Tanks—See Tanks, Emergency or Reserve ... 398
Reserve Valves—See Valves, Two Way Tank ... 436
Rests, Bow ... 330
Rests, Foot ... 330
Rests, Heel ... 332
Retainers, Ball ... 332
Rethreading Tools—See Tools, Tire Valve Rethreading ... 412
Rheostats, Battery Charging ... 332
Riddles and Sieves, Foundry ... 534
Rim Paints—See Paints, Rim ... 280
Rims, Detachable—See Rims, Quick Detachable 332
Rims, Demountable—See Rims, Removable ... 332
Rims, Quick Detachable ... 332
Rims, Removable or Demountable ... 332
Rims, Rubber Steering Wheel ... 332
Rims, Standard ... 334
Rims, Wood ... 334
Rims, Wood Steering Wheel ... 334
Ring Gauges—See Gauges, Plug and Ring ... 492
Ring Grinders—See Grinders, Piston Ring ... 494
Rings, Dust—See Washers, Felt ... 440
Rings, Piston ... 334
Rip Saws—See Saws, Hand ... 536
Rivet Clippers—See Clippers, Bolt and Rivet ... 468
Rivet Sets—See Sets, Rivet ... 538
Rivet Spinners—See Machines, Riveting ... 516
Riveting Hammers—See Tools, Pneumatic ... 546
Riveting Machines—See Machines, Riveting ... 516

PAGE

Rivets, Brass and Copper ... 334
Rivets, Iron ... 336
Rivets, Platinum—See Platinum ... 292
Road Maps—See Maps, Road ... 252
Robe Rail Bags—See Bags, Coat Rail ... 52
Robe Rails—See Rails, Robe ... 322
Robes, Automobile ... 336
Rod Cutters—See Cutters, Rod and Bar ... 474
Rods, Adjustable Valve Lift ... 336
Rods, Aluminum—See Aluminum ... 50
Rods, Brake ... 338
Rods, Brass—See Brass, Sheet ... 84
Rods, Connecting ... 338
Rods, Copper—See Brass, Sheet ... 84
Rods, Fibre—See Fibre ... 162
Rods, Rubber—See Rubber, Hard ... 338
Rods, Steel—See Steel ... 378
Rods, Steering—See Connections, Steering ... 136
Roller Bearings—See Bearings, Roller ... 62
Roller Chains—See Chain, Transmission ... 114
Rollers, Curtain ... 338
Rolls, Bending and Straightening ... 534
Rolls, Straightening—See Rolls, Bending and Straightening ... 534
Rolls, Tool—See Bags, Tool ... 54
Roofing, Panel—See Panels, Wood ... 284
Rope, Bronze Wire ... 338
Rope Clamps—See Clamps, Wire Rope ... 116
Rope, Steel Wire ... 338
Ropes, Tow ... 338
Rough Stuff—See Fillers, Paint ... 164
Rubber Battery Jars—See Jars, Rubber Battery 224
Rubber Buckets—See Buckets, Collapsible ... 84
Rubber Bumpers—See Bumpers, Rubber Spring 88
Rubber Cement—See Cement, Tire ... 114
also Tubing, Soft Rubber ... 428
Rubber Cloth—See Cloth, Rubber ... 120
Rubber Connectors—See Tubing, Soft Rubber ... 428
Rubber Gas Bags—See Bags, Rubber Gas ... 54
Rubber, Hard ... 338
Rubber Horn Bulbs—See Bulbs, Rubber Horn ... 86
Rubber Hose—See Hose, Rubber ... 216
Rubber Mats—See Mats, Rubber ... 252
Rubber Mixers—See Mixers, Rubber Cement ... 520
Rubber Packing—See Packing, Rubber ... 276
Rubber Paints—See Paints, Rubber ... 282
Rubber Patches—See Patches, Tire Repair ... 284
Rubber Plugs—See Plugs, Tire Repair ... 302
Rubber Preservatives—See Compounds, Tire Preserving ... 132
Rubber Putty—See Compounds, Tire Repair ... 132
Rubber Radiator Caps—See Caps, Rubber Radiator ... 92
Rubber Rod—See Rubber, Hard ... 338
Rubber Sheet—See Rubber, Hard ... 338
Rubber Spring Bumpers—See Bumpers, Rubber ... 88
Rubber Testing Instruments—See Instruments, Rubber Testing ... 220
Rubber Tires—See Tires ... 408
Rubber Tubing—See Tubing, Soft Rubber ... 428
Rubbing Stones—See Stones, Rubbing ... 544
Rules, Steel ... 534
Rumbling Barrels—See Barrels, Tumbling ... 455
Running Board Mats—See Mats, Step or Running Board ... 252
Running Board Moulding—See Moulding ... 264
Running Boards—See Steps, Special ... 388
Running Gears—See Gears, Running ... 180
Rust Proofing—See Galvanizing ... 170

S

S-Wrenches—See Wrenches, Nut and Bolt ... 552
Safety Starting Cranks—See Cranks, Safety ... 144
Safety Valves—See Valves, Safety ... 434
Salts, Soldering—See Flux, Soldering ... 488
Sand Blast Machines—See Machines, Sand Blast 516
Sand Blast Systems—See Systems, Sand Blast ... 546
Sand Conveyors—See Machinery, Sand Mixing and Conveying ... 508
Sand Dryers—See Dryers, Sand ... 484
Sand Mixers—See Machinery, Sand Mixing and Conveying ... 508
Sand Paper—See Paper, Emery and Sand ... 520
Sanders, Wood ... 534
Savers, Gasoline—See Mixers, Economizers or Agitators, Fuel ... 258
Saving Jacks—See Jacks, Tire Saving ... 222

Digitized by Google

PAGE

Saw Blades—See Blades, Hack Saw 456
Saw Filing Machines—See Machines, Saw Sharpening 516
Sanding Machines—See Sanders, Wood 534
Saw Sharpeners—See Machines, Saw Sharpening 516
Saws, Band 536
Saws, Circular 536
Saws, Cold 536
Saws, Cross-Cut—See Saws, Hand 536
Saws, Hack—See Saws, Power Hack 536
also Frames, Hack Saw 490
also Blades, Hack Saw 456
Saws, Hand 536
Saws, Hot 538
Saws, Inserted Tooth 538
Saws, Power Hack 536
Saws, Rip—See Saws, Hand 536
Saws, Swing 538
Scrapers, Bearing 538
Scrapers, Carbon 340
Scrapers, Foot 340
Screens, Horn 340
Screw Cases—See Cases, Bolt 462
Screw Drivers—See Drivers, Screw 482
Screw-Eyes, Brass and Iron 340
Screw Machine Chucks—See Chucks, Screw Machine 466
Screw Machine Products 342
Screw Machines—See Machines, Screw 516
Screw Pitch Gauges—See Gauges, Screw Pitch .. 492
Screw Plates—See Taps and Dies 546
Screw Slotters—See Slotters, Screw 540
Screws, Cap and Set 340
Screws, Coach and Lag 340
Screws, Lag—See Screws, Coach 340
Screws, Machine 342
Screws, Set—See Screws, Cap 340
Screws, Thumb 342
Screws, Wood 342
Scribers, Machinists 538
Sealing Compounds—See Compounds, Puncture Sealing 130
Searchlights—See Lamps, Acetylene 226
Seat Backs—See Backs, Metal Seat 52
also Bendings, Wood 66
Seat Bendings—See Bendings, Wood 66
Seat Covers—See Covers, Slip 142
Seat Cushions—See Cushions, Seat 148
Seating Machines—See Machines, Valve Seating .. 518
Seats, Supplementary 346
Secondary Wire—See Wire, Insulated 450
Segar Lighters—See Lighters, Electric Cigar 240
Sensitive Drills—See Drills, Sensitive 480
Separating Tools—See Tools, Spring Leaf Separating 410
Separators, Air 538
Separators, Bow 346
Separators, Gasoline—See Strainers, Gasoline .. 388
Separators, Oil 538
Set Screws—See Screws, Cap 340
Sets, Rivet 538
Shackle Bolts—See Bolts, Spring and Shackle 78
Shades, Headlight—See Dimmers or Shades, Headlight 150
Shaft Couplings—See Couplings, Magneto 140
Shafting, Flexible 348
Shafts, Cam—See Cam-Shafts 90
Shafts, Counter—See Counter-shafts 138
Shafts, Crank—See Crankshafts 144
Shafts, Propeller 348
Shapers, Metal 540
Shapers, Wood 540
Sharpeners, File 540
Shaves, Spoke 540
Shears, Lever 542
Shears, Metal—See Snips or Shears, Metal 542
Sheaves and Pulleys 348
Sheet Aluminum—See Aluminum 50
Sheet Asbestos—See Asbestos 50
Sheet Brass—See Brass, Sheet 84
Sheet Copper—See Brass, Sheet 84
Sheet Fibre—See Fibre, Hard 162
Sheet Packing—See Packing 276
Sheet Rubber—See Rubber, Hard 338
Sheet Steel—See Steel 380
Shells, Copper Boiler 348
Shells, Steel Boiler 348
Sherardizing—See Galvanizing 170
Shields, Wind 348
Shifters, Automatic Gear 350
Shims, Brass and Copper 350
Shipping Covers—See Covers, Paper Shipping 142
Shock Absorbers 350
Shoes, Inner Tire 352

PAGE

Shop Boxes—See Boxes, Sheet Metal 458
Shop Stools—See Stools, Steel 544
Shop Vulcanizers—See Vulcanizers, Shop 440
Shovels, Collapsible—See Spades and Shovels, Collapsible 364
Shovels, Molders 540
Shut-off Valves, Automatic—See Valves, Automatic Fuel Shut-off 432
Side Lamp Brackets—See Brackets, Side and Tail Lamp 82
Side Lamps—See Lamps 230
Sieves, Foundry—See Riddles and Sieves, Foundry 534
Sight Feeds, Independent 354
Signals, Rear Traffic 356
Signs, Radiator—See Monograms, Ornamental Metal 260
Silencers—See Mufflers, Exhaust 264
Silk, Spool 356
Silk, Upholstery 356
Silver, German—See Brass, Sheet 84
Single Spark Ignition Systems—See Systems, Single Spark Ignition 396
Siren Horns—See Horns, Siren 216
Slat Irons—See Irons, Slat 220
Sleeve Protectors—See Protectors, Sleeve 314
Sleeves, Tire Repair 356
Slip Covers—See Covers, Slip 142
Slotters, Screw 540
Snap Hooks—See Hooks, Snap 212
Snap Loops—See Loops, Brass Snap 242
Snips or Shears, Metal 542
Soaps, Automobile 358
Soaps, Hand 362
Soapstone, Tire—See Talc, Tire 396
Sockets, Bow 364
Sockets, Electric Lamp 364
Soda Kettles—See Kettles, Soda and Potash 502
Soft Hammer Molds—See Molds, Soft Hammer .. 520
Solder, Aluminum 542
Solder, Half-and-Half 542
Soldering Acid—See Flux, Soldering 488
Soldering Fluid—See Flux, Soldering 488
Soldering Flux—See Flux, Soldering 488
Soldering Furnaces—See Furnaces, Soldering 492
Solderless Couplings—See Unions, Tubing 432
Solderless Fittings—See Unions, Tubing 432
Solid Tires—See Tires, Solid 408
Solid Wrenches—See Wrenches, Nut and Bolt .. 552
Solution, Priming 364
Spades and Shovels, Collapsible 364
Spanners—See Wrenches 552
Spare Wheels—See Wheels, Demountable 446
also Wheels, Special 448
Spark Coil Boxes—See Boxes, Spark Coil 80
Spark Coils—See Coils, Spark 126
Spark Gaps—See Gaps, Spark 172
Spark Indicators—See Gaps, Spark 172
Spark Lever Grips—See Grips, Throttle 196
Spark Plug Brushes—See Brushes, Spark Plug. 84
Spark Plug Cases—See Cases, Spark Plug 96
Spark Plug Mica—See Mica 256
Spark Plug Porcelains—See Porcelain 314
Spark Plugs—See Plugs, Spark 292
Spark Points—See Points, Sparking 302
Spark Timers—See Timers, Ignition 404
Speaking Tubes—See Tubes, Speaking 426
Special Acetylene Lamp Burners—See Burners, Special 90
Special Jacks—See Jacks, Special 222
Special Machine Work—See Machine Work 246
Special Top Curtains—See Curtains, Special Top 148
Speed Change Gears—See Gears, Transmission .. 182
Speed Change Levers—See Levers, Brake 238
Speed Controllers—See Controllers, Speed 138
Speed Indicators—See Indicators, Speed 500
Speed Meters—See Speedometers 364
Speedometers 364
Speedometer Jigs—See Jigs, Speedometer Gear Centering 224
Spelter, Brazing—See Brass, Brazing 458
Spinners, Rivet—See Machines, Riveting 516
Spiral Wire Belts—See Belts, Spiral 64
Splitting Machines—See Machines, Leather Splitting 512
Spoke Swaging Machines—See Machines, Wire Spoke Swaging 518
Spoke Shaves—See Shaves, Spoke 540
Spokes, Wire 366
Sponges and Chamois 366
Sprags—See Brakes, Drop 84
Spreaders, Spring Leaf—See Tools, Spring Leaf Separating 410
Spring Belts—See Belts, Spiral Wire 64
Spring Bolts—See Bolts, Spring and Shackle 78

Digitized by Google

PAGE

Spring Clips—See Clips, Spring..... 118
Spring Coiling Machines—See Machines, Spring Coiling..... 516
Spring Cotters—See Pins, Cotter..... 288
Spring Engine Starters—See Starters, Mechanical or Spring Engine..... 378
Spring Leaf Lubricating Strips—See Strips, Spring Leaf Lubricating..... 392
Spring Leaf Oil Cups—See Cups, Spring Leaf Oiling 148
Spring Leaf Separating Tools—See Tools, Spring Leaf Separating..... 410
Spring Lifting Tools—See Tools, Valve Spring Lifting..... 414
Spring Repair Clamps—See Clamps, Spring Repair 116
Spring Shackle Bolts—See Bolts, Spring..... 78
Spring Spreaders—See Tools, Spring Leaf Separating..... 410
Spring Steel—See Steel, Spring..... 382
Spring Testing Machines—See Machines, Spring Testing..... 516
Spring Washers—See Washers, Steel Spring..... 442
Spring Wheels—See Wheels, Special..... 448
Spring Winders—See Winders, Spring..... 552
Spring Wire—See Wire, Steel Spring..... 452
Springs, Coil—See Springs, Machinery..... 368
Springs, Cushion—See Springs, Seat..... 368
Springs, Leaf..... 366
Springs, Machinery..... 368
Springs, Seat..... 368
Springs, Steering Gear—See Checks, Steering Gear..... 116
Springs, Supplementary..... 368
Springs, Top Strap..... 370
Springs, Valve—See Springs, Machinery..... 368
Sprockets..... 370
Sprue Cutters—See Cutters, Sprue..... 474
Squares, Machinists..... 542
Stake Pockets—See Pockets, Truck Stake..... 302
Stake Sockets—See Pockets, Truck Stake..... 302
Stampings..... 370
Stamps, Steel..... 542
Stands, Motor Repair..... 544
Stands, Portable..... 544
Stands, Wash Stand Light—See Lights, Wash Stand..... 240
Starter Bushings—See Bushings, Starter or Primer, Attaching..... 90
Starter Gears, Automatic—See Gears, Automatic Starter, Transmission..... 182
Starter Switches—See Switches Electric Starter.. 392
Starters, Acetylene Gas Engine..... 374
Starters, Compressed Air Engine..... 376
Starters, Electric Engine..... 376
Starters, Gasoline or Vapor Engine..... 378
Starters, Manual or Pedal or Lever Engine..... 378
Starters, Mechanical or Spring Engine..... 378
Starting Crank Handles—See Handles, Starting Crank..... 202
Starting Crank Holders—See Holders, Starting Crank..... 208
Starting Cranks, Safety—See Cranks, Safety..... 144
Steam Boilers—See Boilers, Steam..... 76
Steam Condensers—See Condensers, Steam..... 134
Steam Gauges—See Gauges, Steam..... 178
Steam Hammers—See Hammers, Steam..... 500
Steam Pumps—See Pumps, Steam..... 318
Steel, Aluminum Coated..... 386
Steel, Angle, Channel and Tee..... 378
Steel, Bar..... 380
Steel, Channel—See Steel, Angle..... 378
Steel, Chrome Nickel..... 384
Steel, Cold Rolled Bar..... 380
Steel, Cold Rolled Strip..... 380
Steel, Dealers in..... 378
Steel, High Speed..... 386
Steel, Manganese..... 384
Steel, Nickel..... 384
Steel, Self-Hardening..... 386
Steel, Sheet..... 380
Steel, Spring..... 382
Steel, Tee—See Steel, Angle..... 378
Steel, Tool..... 380
Steel, Vanadium..... 386
Steel Castings—See Castings, Steel..... 110
Steel Clutch Discs—See Discs, Steel..... 152
Steel Letters—See Stamps, Steel..... 542
Steel Numbers—See Stamps, Steel..... 542
Steel Pipe—See Pipe, Wrought Iron..... 290
Steel Rules—See Rules, Steel..... 534
Steel Stools—See Stools, Steel..... 544
Steel Tapes—See Tapes, Measuring..... 546
Steel Tube—See Tubing, Steel..... 430
Steel Washers—See Washers, Iron..... 442

PAGE

Steel Wheels—See Wheels, Cast Steel..... 446
also Wheels, Pressed Steel..... 446
Steel Wire—See Wire..... 452
Steel Wire Brooms—See Brooms, Steel Wire..... 460
Steel Wool—See Wool, Steel..... 452
Steering Apparatus—See Gears, Steering..... 182
Steering Connections—See Connections, Steering 136
Steering Gear Checks—See Checks, Steering..... 116
Steering Gears—See Gears, Steering..... 182
Steering Gears, Cyclecar—See Gears, Cyclecar Steering..... 180
Steering Knuckle Boots—See Boots, Steering Knuckle..... 78
Steering Knuckles—See Forgings, Drop..... 168
Steering Wheel Covers—See Covers, Steering Wheel..... 142
Steering Wheel Rims—See Rims, Wood Steering Wheel..... 334
also Rims, Rubber Steering Wheel..... 332
Steering Wheel Switches—See Switches, Steering Wheel..... 396
Steering Wheels—See Wheels, Steering..... 448
Steering Wheels, Electrically Heated—See Wheels, Heated Steering..... 448
Step Hangers—See Hangers, Pressed Steel Step. 202
Step Mats—See Mats, Step or Running Board.. 252
Steps, Forged—See Forgings, Drop..... 168
Steps, Special..... 388
Stirrups, Jack Handle..... 388
Stock Racks—See Racks, Metal Tool..... 532
Stocks, Die..... 544
Stones, Oil..... 388
Stones, Rubbing..... 544
Stools, Steel..... 544
Storage Batteries—See Batteries, Storage..... 58
Storage Battery Acid—See Electrolyte, Storage Battery..... 158
Storage Tanks—See Tanks, Gasoline Storage..... 400
Stove Bolts—See Bolts, Tire..... 78
Straightening Machines, Core Wire—See Machines, Core Wire Straightening..... 510
Straightening Rolls—See Rolls, Bending..... 534
Straightening Presses—See Presses, Bench Straightening..... 526
Strainers, Gasoline..... 388
Strap Buckles—See Buckles, Strap..... 86
Strap Loops—See Loops, Brass Snap..... 242
Strap Snaps—See Hooks, Snap..... 212
Strap Springs—See Springs, Top Strap..... 370
Straps, Hood..... 390
Straps, Leather..... 390
Straps, Rebound..... 390
Straps, Starting Crank—See Holders, Starting Crank..... 208
Straps, Web..... 392
Strips, Spring Leaf Lubricating..... 392
Supplementary Springs—See Shock Absorbers.. 350
Supplies, Dealers in..... 392
Supplies, Electro Plating..... 544
Supplies, Factory—See Supplies, Machine Shop 544
Supplies, Foundry..... 544
Supplies, Garage—See Supplies, Machine Shop.. 544
Supplies, Machine Shop..... 544
Supply Jobbers—See Jobbers, Supply..... 224
Supports, Car—See Jacks, Tire Saving..... 222
Supports, Hood..... 392
Surface Gauges—See Gauges, Surface..... 494
Surface Grinders—See Grinders, Surface..... 496
Swages—See Fullers and Swages..... 490
Swaging Machines—See Machines, Wire Spoke Swaging..... 518
Swing Frame Grinders—See Grinders, Swing Frame..... 496
Swing Saws—See Saws, Swing..... 538
Switchboards, Charging—See Panels, Charging.. 282
Switches, Automatic Cut-out..... 392
Switches, Automatic Time..... 392
Switches, Electric Starter..... 392
Switches, Foot..... 392
Switches, Ignition..... 394
Switches, Kick—See Switches, Ignition..... 394
Switches, Light..... 394
Switches, Lock..... 394
Switches, Steering Wheel..... 396
Switches, Thermostat Controlled—See Cut-outs, Thermostatic..... 148
Systems, Dust Exhaust—See Collectors, Dust..... 468
Systems, Electric Lighting..... 396
Systems, Sand Blast..... 546
Systems, Single Spark Ignition..... 396

Digitized by Google

T

PAGE

Tables, Saw—See Saws ... 536
Tachometers—See Indicators, Speed ... 500
Tacks, Upholstery ... 396
Tail Lamp Brackets—See Brackets, Side and Tail Lamp ... 82
Tail Lamps—See Lamps ... 230
Tail Light Indicators—See Indicators, Tail Light ... 218
Talc, Tire ... 396
Tank Ejectors—See Ejectors ... 158
Tank Gauges—See Gauges, Gasoline Tank ... 178
Tank Keys—See Keys, Acetylene ... 224
Tanks, Acetylene ... 398
Tanks, Chemical Fire ... 546
Tanks, Emergency or Reserve ... 398
Tanks, Fire—See Tanks, Chemical Fire ... 546
Tanks, Fuel and Water ... 398
Tanks, Oxygen ... 402
Tanks, Storage ... 400
Tanks, Tire Inflating ... 402
Tanks, Tire Testing ... 402
Tap Extractors—See Extractors, Broken Tap ... 486
Tap Wrenches—See Wrenches, Tap ... 556
Tape, Insulating and Tire ... 402
Taper Pins—See Pins, Taper ... 288
Tapes, Measuring ... 546
Tapes, Steel—See Tapes, Measuring ... 546
Tapping Drills—See Drills, Upright ... 480
Tapping Machines—See Machines, Tapping ... 516
Taps and Dies ... 546
Taximeters ... 402
Tee Steel—See Steel, Angle ... 378
Tees, Pipe—See Fittings, Brass Pipe ... 164
Telephones, Limousine ... 402
Tell Tales—Tail Light—See Indicators, Tail Light ... 218
Tempering—See Treating, Heat ... 420
Tempering Furnaces—See Furnaces, Annealing ... 490
Tempering, Oil—See Treating, Heat ... 420
Tenoning Machines—See Machines, Wood Mortising ... 518
Terminals, Wire ... 402
Testers, Battery—See Gauges, Battery ... 174
Testers, Gasoline—See Hydrometers ... 218
Testers, Metal—See Instruments, Steel Testing ... 220
Testers, Rubber—See Instruments, Rubber Testing ... 220
Testing Dynamometers—See Dynamometers, Electric Testing ... 156
Testing Instruments, Gear—See Instruments, Gear Testing ... 220
Testing Instruments, Motor—See Instruments, Motor Testing ... 220
Testing Instruments, Rubber—See Instruments, Rubber Testing ... 220
Testing Machines, Spring—See Machines, Spring Testing ... 516
Thermometers, Radiator—See Meters, Heat Indicating ... 256
Thermometers, Vulcanizer ... 404
Thermostat Controlled Switches—See Cut-outs, Thermostatic ... 148
Thermostatic Cut-outs—See Cut-outs, Thermostatic ... 148
Thread, Top and Upholstery ... 404
Threaders, Bolt—See Machines, Bolt Threading ... 510
Threading Tools—See Tools, Threading ... 548
Throttle Lever Grips—See Grips, Throttle ... 196
Throttle Valves—See Valves, Steam Throttle ... 434
Thumb Nuts—See Nuts, Thumb ... 268
Thumb Screws—See Screws, Thumb ... 342
Tilting Bodies—See Bodies Special Dumping ... 76
Time Recorders—See Registers, Autographic and Manifold ... 534
Timers, Ignition ... 404
Tinners Furnaces—See Furnaces, Soldering ... 492
Tinners Snips—See Snips, Metal ... 542
Tips, Burner—See Burners, Acetylene ... 88
Tire Alarms—See Alarms, Tire ... 49
Tire Bandage Wrapping Machines—See Machines, Tire Bandage Wrapping ... 518
Tire Bands—See Bands, Non-Skid ... 56
also Sleeves, Tire Repair ... 356
Tire Bolts—See Bolts, Stove ... 78
Tire Cases—See Cases, Tire ... 98
Tire Cement—See Cement, Tire Repair ... 114
Tire Chain Tools—See Tools, Tire Chain Repair ... 410
Tire Chains—See Chains or Grips, Non-Skid ... 116
Tire Cores—See Molds, Tire Vulcanizing ... 520
Tire Fillers—See Compounds, Tire Filling ... 132
Tire Filling Compounds—See Compounds, Tire Filling ... 132
Tire Gauges—See Gauges, Tire ... 180
Tire Holders—See Holders, Tire ... 208
Tire Inflaters—See Pumps ... 316
also Tanks ... 398
Tire Inflating Tanks—See Tanks, Tire Inflating ... 402
Tire Irons—See Tools, Tire ... 412
Tire Kits—See Kits, Tire Repair ... 132
Tire Locks—See Holders, Tire ... 208
Tire Lugs—See Lugs, Tire ... 244
Tire Mastics—See Compounds, Tire Repair ... 132
Tire Molds—See Molds, Tire Vulcanizing ... 520
Tire Patches—See Patches, Tire ... 284
Tire Plastics—See Compounds, Tire Repair ... 132
Tire Plugs—See Plugs, Tire ... 302
Tire Powder—See Talc, Tire ... 396
Tire Preserving Compounds—See Compounds, Tire Preserving ... 132
Tire Pressure Gauges—See Gauges, Tire Pressure ... 180
Tire Protectors—See Treads, Tire ... 418
Tire Pump Connections—See Connections, Tire ... 136
Tire Pumps—See Pumps ... 316
Tire Repair Cement—See Cement, Tire Repair ... 114
Tire Repair Compounds—See Compounds, Tire Repair ... 132
Tire Repair Kits—See Kits, Tire Repair ... 226
Tire Repair Pliers—See Pliers, Tire Repair ... 292
Tire Saving Jacks—See Jacks, Tire Saving ... 222
Tire Sleeves—See Sleeves, Tire ... 356
Tire Straps—See Straps, Leather ... 390
Tire Talc—See Talc, Tire ... 396
Tire Tanks—See Tanks, Tire Inflating ... 402
Tire Tape—See Tape, Insulating and Tire ... 402
Tire Testing Tanks—See Tanks, Tire Testing ... 402
Tire Tools—See Tools, Tire ... 412
also Tools, Tire Valve Rethreading ... 412
Tire Treads—See Treads, Tire ... 418
Tire Valve Tools—See Tools, Tire Valve Rethreading ... 412
Tire Valves—See Valves, Tire ... 434
Tire Vulcanizers—See Vulcanizers ... 438
Tires, Cushion—See Tires, Special ... 410
Tires, Emergency—See Tires, Special ... 410
Tires, Flanged Steel ... 406
Tires, Leather ... 406
Tires, Pneumatic ... 406
Tires, Solid ... 408
Tires, Special ... 410
Toilet Cases—See Cases, Toilet ... 98
Tool Bags—See Bags, Tool ... 54
Tool Box Locks—See Locks, Cabinet and Pad ... 242
also Catches, Spring ... 112
Tool Boxes—See Boxes, Tool ... 82
Tool Grinders—See Grinders ... 496
Tool Handles—See Handles, File and Tool ... 500
Tool Holders—See Holders, Lathe and Planer Tool ... 500
Tool Post Grinders—See Drills, Electric Portable ... 478
Tool Posts—See Posts, Tool ... 526
Tool Racks—See Racks, Metal Tool ... 532
Tool Rolls—See Bags, Tool ... 54
Tool Steel—See Steel ... 380
Tools, Chain Repair ... 410
Tools, Cotter Pin Pulling—See Pullers, Cotter Pin ... 526
Tools, Electro Magnetic Lifting ... 410
Tools, Lathe and Planer ... 546
Tools, Molders ... 546
Tools, Piston Ring Removing ... 410
Tools, Planer—See Tools, Lathe and Planer ... 546
Tools, Pneumatic ... 546
Tools, Scraping—See Scrapers, Bearing ... 538
Tools, Speedometer Gear Centering—See Jigs, Speedometer Gear Centering ... 224
Tools, Spring Leaf Separating ... 410
Tools, Threading ... 548
Tools, Tire Chain Attaching ... 410
Tools, Tire Chain Repair ... 410
Tools, Tire ... 412
Tools, Tire Valve Rethreading ... 412
Tools, Valve Grinding ... 412
Tools, Valve Seating or Facing ... 414
Tools, Valve Spring Lifting ... 414
Tooth Chamfering Machines—See Machines, Gear Tooth Chamfering ... 512
Top Bows—See Bows, Top ... 80
Top Cables—See Cables, Top ... 90
Top Clamps—See Holders, Top ... 210
Top Curtains—See Curtains, Special Top ... 148
Top Dressing—See Dressing, Leather ... 152
also Dressing, Mohair ... 154
Top Fixtures—See Fasteners, Curtain ... 162
also Fittings, Top ... 166
also Irons, Body ... 220
also Rests, Bow ... 330
also Separators, Bow ... 346
Top Holders—See Holders, Top ... 210
Top Irons—See Irons, Body ... 220
Top Lifters—See Lifters, One Man Top ... 238
Top Lining Dye—See Dye, Top Lining ... 156

Digitized by Google

PAGE

Top Strap Springs—See Springs, Top Strap..... 370
Top Straps—See Straps, Leather..... 390
Tops, Automobile..... 414
Torches and Furnaces, Gasoline or Kerosene..... 548
Torches, Kerosene—See Torches, Gasoline..... 548
Tote Boxes—See Boxes, Sheet Metal..... 450
Touring Baskets—See Hampers, Touring..... 200
Tow Ropes—See Ropes, Tow..... 338
Traffic Signals—See Signals, Rear Traffic..... 356
Trailers, Truck..... 418
Trammels..... 548
Transfers, Decalcomania..... 418
Transmission Gears—See Gears, Transmission..... 182
Transmissions, Automatic Starter—See Gears, Automatic Starter Transmission..... 182
Transmissions, Cyclecar—See Gears, Cyclecar Transmission..... 182
Treads, Detachable..... 418
Treating, Heat..... 420
Trestles—See Horses, Trestles and Trucks..... 500
Trimmers, Clips—See Clips, Trimmers..... 118
Trimmers, Paste—See Paste, Trimmers..... 284
Trimmers, Wood..... 548
Trimmings, Cloth and Carpet..... 420
Trimmings, Leather—See Leather..... 234
Trimmings, Metal..... 422
Truck Stake Pockets—See Pockets, Truck Stake.. 302
Truck Stake Sockets—See Pockets, Truck Stake.. 302
Truck Straps—See Straps, Leather..... 390
Truck Trailers—See Trailers, Truck..... 418
Trucks, Repair..... 422
Trucks, Wheel—See Turntables..... 430
Trucks and Castors, Wrecking..... 422
Trunk Racks—See Racks, Trunk..... 320
Trunks, Leather, Fabric and Board..... 422
Trunks, Metal..... 424
Tube Cases—See Cases, Tire..... 98
Tube Expanders—See Expanders, Boiler..... 484
Tubes, Inner..... 424
Tubes, Mica—See Mica..... 256
Tubes, Porcelain—See Porcelain..... 314
Tubes, Speaking..... 426
Tubing, Aluminum..... 426
Tubing, Brass and Copper..... 426
Tubing Connections—See Connections, Gas Tubing..... 136
Tubing Fibre—See Fibre, Hard..... 162
Tubing, Flexible Metallic..... 428
Tubing, Hard Rubber—See Rubber, Hard..... 338
Tubing, Iron Lined Brass..... 428
Tubing, Soft Rubber..... 428
Tubing, Steel..... 430
Tubing Unions—See Unions, Tubing..... 432
Tubular Boilers—See Boilers, Steam..... 76
Tufting Buttons—See Buttons, Upholstery..... 90
Tufting Machines—See Machines, Upholstery.... 518
Tufting Twine—See Twine, Tufting..... 432
Tumbling Barrels—See Barrels, Tumbling..... 455
Tungsten Lamps—See Lamps, Miniature Tungsten 232
Turn-Buckles, Wrought..... 430
Turntables, Automobile..... 430
Turret Drills—See Drills, Turret..... 480
Turret Lathes—See Lathes, Turret..... 504
Tuyere Irons—See Irons, Tuyere..... 502
Twine, Tufting..... 432
Twist Drills—See Drills, Twist..... 480
Two Way Cocks—See Valves, Two Way Tank..... 436
Two Way Valves—See Valves, Two Way Tank... 436

U

Under Bonnet—See Pans, Dust..... 284
Unions, Pipe—See Fittings, Pipe..... 164
Unions, Tubing..... 432
Universal Grinders—See Grinders, Universal.... 496
Universal Joint Covers—See Boots, Steering Knuckle..... 78
Universal Joints—See Joints, Universal..... 224
Upholstery Bindings—See Bindings, Upholstery.. 66
Upholstery Broadcloth—See Broadcloth..... 84
Upholstery Button Machines—See Machines, Upholstery Button..... 518
Upholstery Buttons—See Buttons, Upholstery.. 90
Upholstery Carpet—See Carpet..... 96
Upholstery Cloth—See Cloth, Rubber..... 120
also Broadcloth..... 84
also Silk..... 356
also Whipcord..... 450

PAGE

Upholstery Felt—See Moss, Upholstery..... 262
Upholstery Hair—See Hair, Upholstery..... 200
Upholstery Lace—See Lace, Coach..... 226
Upholstery Leather—See Leather, Artificial..... 234
also Leather, Natural..... 236
Upholstery Machines—See Machines, Upholstery 518
Upholstery Moss—See Moss, Upholstery..... 262
Upholstery Nails—See Tacks, Upholstery..... 396
Upholstery Silk—See Silk, Upholstery..... 356
Upholstery Springs—See Springs, Seat..... 368
Upholstery Tacks—See Tacks, Upholstery..... 396
Upholstery Thread—See Thread, Upholstery..... 404
Upholstery Tufting Machines—See Machines, Upholstery Tufting..... 518
Upholstery Whipcord—See Whipcord..... 450
Upright Drills—See Drills, Upright..... 480

V

V Belts—See Belts, V..... 64
Valve Grinding Compounds—See Compounds, Valve Grinding..... 134
Valve Grinding Machines—See Machines, Valve Seating..... 518
Valve Grinding Tools—See Tools, Valve Grinding 412
Valve Spring Lifting Tools—See Tools, Valve Spring Lifting..... 414
Valve Plunger Wrenches—See Wrenches, Valve Plunger..... 452
Valve Reducing Regulators—See Regulators, Acetylene Pressure..... 328
Valve Seating Machines—See Machines, Valve Seating..... 518
Valve Springs—See Springs, Machinery..... 368
Valve Stem Guide Reamers—See Reamers, Valve Stem Guide..... 534
Valve Tools—See Tools, Tire Valve Rethreading.. 412
Valve Turning Tools—See Tools, Valve Seating.. 414
Valves, Angle, Globe, Check and Gate..... 432
Valves, Automatic Fuel Shut-off..... 432
Valves, Ball Check..... 432
Valves, Gas Engine..... 432
Valves, Gasoline Lock..... 432
Valves, Gate—See Valves, Angle..... 432
Valves, Globe—See Valves, Angle..... 432
Valves, Mixing—See Vaporizers..... 436
Valves, Muffler Cut Out..... 434
Valves, Needle..... 434
Valves, Pressure Regulating—See Regulators, Pressure..... 328
Valves, Reserve—See Valves, Two Way Tank..... 436
Valves, Steam Safety..... 434
Valves, Steam Throttle..... 434
Valves, Tire..... 434
Valves, Tire Safety..... 436
Valves, Two Way Tank..... 436
Vanadium..... 436
Vanadium Steel—See Steel, Vanadium..... 386
Vapor Engine Starters—See Starters, Gasoline or Vapor Engine..... 378
Vaporizers..... 436
Varnish Brushes—See Brushes, Paint and Varnish 460
Varnish Preservatives—See Polishes, Automobile Body..... 302
Varnish Removers—See Removers, Paint and Varnish..... 328
Varnishes..... 436
Vases, Flower—See Holders, Bouquet..... 206
Vehicle Motion Recorders—See Recorders, Vehicle. 326
Veneer Roofing—See Panels, Wood..... 284
Veneers—See Panels, Wood..... 284
Ventilators, Limousine and Fore-Door..... 438
Ventilators, Wind Shield..... 438
Vertical Boring Machines—See Machines, Vertical Boring..... 510
Vibrators, Master—See Coils, Spark..... 126
Vises, Bench—See Vises, Machinists..... 550
Vises, Drill Press..... 548
Vises, Hand..... 548
Vises, Machinists..... 550
Vises, Milling Machine..... 550
Vises, Patternmakers and Woodworkers..... 550
Vises, Pin..... 550
Vises, Pipe..... 550
Vises, Planer..... 552
Vises, Special and Portable..... 552
Vises, Woodworkers—See Vises, Patternmakers and Woodworkers..... 550

Digitized by Google

PAGE

Voltmeters, Pocket—See Gauges, Battery..... 174
Voltmeters, Standard—See Ammeters, Standard 50
Vulcanizer Thermometers—See Thermometers, Vulcanizer..... 404
Vulcanizers, Portable..... 438
Vulcanizers, Shop..... 440
Vulcanizing Cores—See Molds, Tire Vulcanizing 520
Vulcanizing Molds—See Molds, Tire Vulcanizing 520

W

Warmers, Foot—See Heaters, Automobile..... 204
Wash Stand Lights—See Lights, Wash Stand.. 240
Washer Cutters—See Cutters, Washer or Gasket. 474
Washer Punches—See Punches, Arch and Washer 530
Washers, Cork..... 440
Washers, Felt..... 440
Washers, Fibre—See Fibre..... 162
Washers, Finishing..... 440
Washers, Iron and Steel..... 442
Washers, Leather..... 442
Washers, Lock—See Nuts, Lock..... 268
Washers, Mica—See Mica..... 256
Washers, Pump—See Washers, Leather..... 442
Washers, Rubber—See Rubber..... 338
Washers, Steel—See Washers, Iron..... 442
Washers, Steel Spring..... 442
Washers, Vehicle..... 442
Waste Cans—See Cans, Waste..... 462
Waste, Cotton..... 444
Watch Holders—See Holders, Watch..... 210
Watches, Limousine..... 444
Water Alarms—See Columns, Water..... 136
Water Circulation Gauges—See Gauges, Water Circulation..... 180
Water Column Mirrors—See Mirrors, Water Gauge 258
Water Columns—See Columns, Water..... 136
Water Connections—See Connections, Brass Water 134
Water Coolers—See Radiators..... 322
Water Level Regulators—See Regulators, Water Level..... 328
Water Line Gauges—See Gauges, Boiler Water.. 178
Ways, Balancing..... 552
Wearing Apparel—See Caps..... 92
also Clothing..... 132
also Gloves..... 188
also Leggings..... 238
also Mufflers..... 266
Web Straps—See Straps, Web..... 392
Webbing, Coach—See Lace, Coach..... 226
Webbing, Jute..... 444
Welders Goggles—See Goggles, Mechanics and Welders..... 494
Welding Compounds—See Compounds, Welding 470
Welding, Autogenous..... 444
Welding, Electric..... 446
Welding Flux—See Compounds, Welding..... 470
Welding Machines—See Machines, Electric Welding..... 512
also Machines, Autogenous Welding 508
Welts—See Bindings, Upholstery..... 66
Wet Tool Grinders—See Grinders, Wet Tool.... 496
Wheel Pullers—See Pullers, Gear and Wheel..... 528
Wheel Trucks—See Castors and Wheel Trucks.... 112
Wheels, Buffing and Polishing..... 552
Wheels, Cast Steel..... 446
Wheels, Demountable..... 446
Wheels, Grinding..... 552
Wheels, Heated Steering..... 448
Wheels, Knurling—See Knurls..... 502
Wheels, Polishing—See Wheels, Buffing and Polishing..... 552
Wheels, Pneumatic—See Wheels, Special..... 448
Wheels, Pressed Steel..... 446
Wheels, Special..... 448
Wheels, Spring—See Wheels, Special..... 448
Wheels, Steering..... 448
Wheels, Wire..... 448
Wheels, Wood..... 448

PAGE

Whipcord, Upholstery..... 450
Whistles, Exhaust—See Horns, Exhaust..... 214
Wicking, Candle..... 452
Wicking, Felt Lubricator..... 450
Wicks, Lamp..... 450
Wind Shield Cleaners—See Cleaners, Glass Wind Shield..... 118
Wind Shield Glass—See Glass, Polished Plate 188
Wind Shield Ventilators—See Ventilators, Wind Shield..... 438
Wind Shields—See Shields, Wind..... 348
Winders, Spring..... 552
Window Glass—See Glass, Polished Plate..... 188
Window Regulators—See Regulators, Window.. 328
Wing Nuts—See Nuts, Thumb..... 268
Wing Screws—See Screws, Thumb..... 342
Wipers and Polishing Cloths..... 450
Wire, Bowden..... 450
Wire, Insulated..... 450
Wire, Phosphor Bronze..... 452
Wire Spoke Swaging Machines—See Machines, Wire Spoke Swaging..... 518
Wire, Steel Spring..... 452
Wire Belts—See Belts, Spiral Wire..... 64
Wire Brooms—See Brooms, Steel Wire..... 460
Wire Cable—See Rope..... 338
Wire Cloth—See Cloth, Wire..... 122
Wire Gauges—See Gauges, Drill and Wire..... 492
Wire Glass—See Glass, Wire..... 188
Wire Lamps—See Lamps, Wire..... 234
Wire Rope—See Rope, Wire..... 338
Wire Rope Clamps—See Clamps, Wire Rope.... 116
Wire Spokes—See Spokes, Wire..... 366
Wire Terminals—See Terminals, Wire..... 402
Wiring Cleats—See Cleats, Fibre Wiring..... 118
Wood Bending Machines—See Machines, Wood Bending..... 518
Wood Bendings—See Bendings, Wood..... 66
Wood Bodies—See Bodies, Wood..... 66
Wood Boring Machines—See Machines, Wood Boring..... 518
Wood Dashes—See Dashes, Wood..... 150
Wood Fillets—See Fillets, Wood..... 486
Wood Forming Cutters—See Cutters, Wood Forming..... 474
Wood Mud Guards—See Guards, Wood Mud..... 198
Wood Planers—See Planers, Wood..... 520
Wood Sanders—See Sanders, Wood..... 534
Wood Screws—See Screws, Wood..... 342
Wood Shapers—See Shapers, Wood..... 540
Wood Trimmers—See Trimmers, Wood..... 548
Wood Wheels—See Wheels, Wood..... 448
Wooden Mallets—See Mallets, Wooden..... 518
Woodworkers Vises—See Vises, Patternmakers and Woodworkers..... 550
Woodworking Machinery—See Lathes, Woodworking..... 506
also Planers, Wood... 520
also Sanders, Wood.. 534
also Saws, Band 536
also Saws, Circular... 536
also Saws, Swing..... 538
also Shapers, Wood.. 540
also Trimmers, Wood 548
Wool, Steel..... 452
Wrapping Machines—See Machines, Tire Bandage Wrapping..... 518
Wrecking Castors—See Trucks and Castors, Wrecking..... 422
Wrecking Trucks—See Trucks and Castors, Wrecking..... 422
Wrenches—See Wrenches, Nut and Bolt..... 552
Wrenches, Adjustable—See Wrenches, Nut and Bolt..... 552
Wrenches, Alligator—See Wrenches, Nut and Bolt 552
Wrenches, Bolt—See Wrenches, Nut and Bolt.. 552
Wrenches, Drop Forged—See Wrenches, Nut and Bolt..... 552
Wrenches, Monkey—See Wrenches, Nut and Bolt 552
Wrenches, Nut and Bolt..... 552
Wrenches, Open End—See Wrenches, Nut and Bolt 552
Wrenches, Pipe..... 556
Wrenches, Reamer—See Wrenches, Tap and Reamer..... 556
Wrenches, Solid—See Wrenches, Nut and Bolt.. 552
Wrenches, Tap and Reamer..... 556
Wrenches, Valve Plunger..... 452

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INDEX TO TABLES AND DATA

A

PAGE

Air, Atmospheric—Proportions of 602
Air—Relation of Gasoline Vapor to 602
Air Pressure for Inflating Pneumatic Tires Recommended by Leading Makers 631
A. L. A. M. Standard Horse Power Formula 567
Alcohol, Denatured—Properties of 603
Allowances for Fits in Automobile Construction 580
Aluminum, Cast—Properties of 625
Aluminum Castings—Shrinkage of 625
Aluminum—Effect of Heat on Tensile Strength and Expansion of 625
Aluminum Sheet and Bar—Weight of 623
Anti-Freezing Solutions 635-636
Approximate Horse Power of Four Cycle Automobile Engines 564
Areas of Circles 610
Areas of Small Circles 611
Atmospheric Air—Capacity of, for Vapor 605
Atmospheric Air—Proportions of 602
Automobile Spring Construction 632
Automobile Wheel Data 629

B

Balls, Aluminum, Iron, Copper, Brass and Lead—Weight of 623
Balls, Steel—Standard Sizes and Weights 636
Batteries, Storage—Charging and Discharging of 598
Batteries, Storage—Reversible Chemical Equations showing changes which take place in 598
Baume Hydrometer and Specific Gravity Equivalents 613
Bearings, Ball—Tolerance Table for 569
Benzol—Tests with 603
Boiling Point of Water at Various Altitudes 614
Brakes—Work done by 578
Brass, Sheet and Bar—Weight of 623
British Thermal Units—Kilogramme Calories Equivalent to 618
Bronze, Parsons Manganese—Results of Tests of 624

C

Cast Iron Parts—Specifications for 627
Castings, Aluminum—Shrinkage of 625
Castings, Cylinder—Specifications for 624
Castings—Proportionate Weight of to Weights of Wood Patterns 621
Causes of Pneumatic Tire Troubles 631
Chain—Formula for Calculating Length of 633
Charging of Storage Batteries 598
Chemical Composition and Physical Properties of Various Substances that have a Heat Value 606
Chrome Nickel Steel—Tests of 626
Circles—Circumference and Areas of 610
Circumference—Table for the Division of the 609
Circumference and Areas of Circles 610
Clincher Tire and Rim Dimensions 630
Clutches—Work Done by 578
Co-Efficients of Friction 582
Combustion Constants of Various Gases and Fuels 600
Commercial Vehicles—Energy Consumption of 581
Compound Equivalents 597
Compression—Variation of Volume and Temperature with 569
Compression Tests 624
Convenient Metric Conversion 617
Crank Angles and Corresponding Piston Positions 570-571
Crank Shaft—Dimensions of Typical 574

D

Decimal Fractions of a Lineal Inch in Millimetres 614
Denatured Alcohol—Properties of 603
Dimensions and Lift of Poppet Valves for a Given Size of Opening 573
Dimensions of Standard Weight Wrought-Iron Pipe 643
Dimensions, Overall of Typical Modern Cars 583
Drill Sizes for S. A. E. Threads 641
Drill Sizes for Standard Threads 641
Driving Fits—Allowances for 580

E

Effect of Heat on Tensile Strength and Expansion of Pure Aluminum 625
Efficiency Test of Automobile Radiator 628
Energy Consumption of Commercial Vehicles 581

Digitized by Google

F

PAGE

Fans, Motor Cooling—Tests of Power Consumption 576
Firing of Six Cylinder Motors 568
Fit Allowances 580
Force Fits—Allowances for 580
Formula, Speed 583
Formula for Calculating Length of Chain 633
Formula for Determining Diameters of Sprockets for Roller Chains 634
Formula for Horse Power—A. L. A. M. Standard 567
Formula for Piston Velocity 573
Formulas for Conversion of Thermometer Scales 613
Formulas—Hill Climbing 589
Formulas for Horse Power 562–563
Fractions—Decimal Equivalents of 611
French and American Equivalent Measures 617–618
Friction—Co-Efficients of 582
Fuel Consumption of Motor Wagons 582
Fuel Costs—Table of Comparative 601
Fuels—Combustion Constants of 600

G

Gases—Combustion Constants of 600
Gases—Properties of 603
Gasoline—Properties of 603
Gasoline—Tests with 603
Gasoline, Viscosity of 605
Gasoline Constituents, Properties of 604
Gasoline Vapor—Relation of Air to 602
Gauges—Standard Used in the United States 619
Gear Wheels—Sizing and Cutting of 643–644
Grades—Measurement of 590
Gradients—Table of 597

H

Heat Losses in Gasoline Motors 600
Heat of Hydrocarbons 604
Hill Climbing Formulas 589
Horse Power Formula—A. L. A. M. Standard 567
Horse Power Formulas 562–563
Horse Power of Four Cycle Engines 564
Horse Power of Internal Combustion Motors 562–563–564
Horse Power Reference Table, O'Gorman's 566–567
Horse Power Reference Tables 559–560–561
Horse Power of Two Cycle Engines 565
Hydrocarbons—Specific Heat of 604
Hydrogen and Carbon in Fuels—Proportions of 604
Hydrometer and Specific Gravity Equivalents 613

I

Increase in Air Pressures Caused by Driving 631
Indicated Horse Power Formula 559
Indicated Horse Power Tables 559–560–561
International (Metric System) Standard 60° Thread 639
Iron, Cast—Specifications for 627
Iron, Malleable—Tests of 627
Iron Plate—Standard Gauge for 620

L

List of Nine Different Standard Gauges Used in the United States 619

M

Malleable Iron Tests 627
Manganese Bronze, Parsons—Results of Tests of 624
Measurement of Grades 590
Measuring the Contents of Horizontal Cylindrical Tanks 608
Melting Points of Metals 626
Metals—Melting Points of 626
Metals—Weights of 621
Metric Conversion Table 617
Metric Tires and their American Equivalents 629
Mileage of Pneumatic Tires 632
Military Wagon Trials—Results of 1910 582
Millimetres—United States Official Conversion Table 615
Molecular Weight of Petroleum Distillates 607
Motors, Internal Combustion—Horse Power of 562–563–564
Motors—Sequence of Firing 568
Muffler—Power Loss Due to Use of 575

Digitized by Google

N

PAGE

Nickel Chrome Steel—Tests of 626
Nuts, Castle—S. A. E. Standard 637
Nuts, Plain Hexagon—S. A. E. Standard 637

O

O'Gorman's Horse Power Reference Table 566–567
Overall Dimensions of Typical Modern Cars 583

P

Parsons Manganese Bronze—Results of Tests of 624
Petroleum Distillates.—Molecular Weight of 607
Pipe, Standard Weight Wrought-Iron—Dimensions of 643
Piston Positions and Crank Angles 570–571
Piston Velocity—Formula for 573
Plugs, Spark—S. A. E. Standard 642
Pneumatic Tire Troubles—Causes of 631
Pneumatic Tires—Mileage of 632
Poppet Valves—Dimensions and Lift of 573
Pounds per Square Inch in Kilogrammes per Square Centimetre 616
Power Consumed in Moving a Plane Surface at Different Velocities in the Open Air 579
Power Consumption Test of Four Cylinder Motor Cooling Fan 576
Power Loss Due to Use of Muffler on Four-Cylinder Automobile Motor 575
Power Required to Overcome Wind Resistance 572
Pressures, Mean Effective 568
Products of Combustion 600
Properties of Gases 603
Properties of Gasoline Constituents 604
Properties of Gasoline and Denatured Alcohol 603
Proportionate Weight of Castings to Weight of Wood Patterns 621
Proportions between Axle Loads and Tire Sizes Adopted by American Tire Makers 630
Push Fits—Allowances for 580

R

Racing of Motor at High Speeds 571
Radiator—Efficiency Test of 628
Rate of Speed per Hour for Elapsed Time over the Measured Mile from One to Three Minutes 587
Reference Table showing Equivalent Speed in Miles and Kilometres per Hour for Elapsed Time Over the Measured Mile or Kilometres 586–587–588
Reference Tables for Indicated Horse Power 559–560–561
Relation of Gasoline Vapor to Air 602
Results of 1910 Military Wagon Trials 582
Reversible Chemical Equations Showing Changes Which Take Place in the Lead Storage Battery 598
Revolutions per Minute of Auto Road Wheels at Different Rates of Speed 584
Rims, Clincher—Dimensions of 630
Rod Ends and Yokes—S. A. E. Standard 638
Running Fits—Allowances for 580

S

S. A. E. Hexagon Plain Nuts 637
S. A. E. Yoke and Eye Rod 638
S. A. E. Standard Castle Nuts 637
S. A. E. Standard Spark Plug 642
Screw Threads—Drill Sizes for 641
Screw Threads—International Standard 60° 639
Screw Threads—United States 60° 640
Screw Threads—Whitworth 641
Screws, Hexagon Head—S. A. E. Standard 637
Sheet Steel—Standard Gauge for 619
Sheet and Bar Aluminum, Brass and Steel—Weight in Pounds of 623
Shrinkage of Aluminum Castings 625
Sizes of Numbers of the United States Standard Gauge for Sheet and Plate Iron and Steel 620
Solutions—Anti-Freezing 635–636
Spark Plug—S. A. E. Standard 642
Specific Heat of Hydrocarbons 604
Specifications for Cast Iron Parts 627
Speed in Miles per Hour with Different Gear Ratios and Road Wheel Sizes 588
Speed Equivalents in American and French Measurements 585
Speed Formula 585
Speed Table—Automobile 585
Speed Table in Miles and Kilometres 586–587–588
Springs, Automobile—Construction 632
Sprockets—Formula for Determining Diameters of 634
Steel, Flat—Weight of per Lineal Foot 622
Steel, Sheet—Standard Gauge for 619
Steel, Sheet and Bar—Weight of 623
Steel Balls—Standard Size and Weights 636
Storage Batteries—Reversible Chemical Equations Showing Changes which Take Place in 598
Storage Battery Charging and Discharging 598
Strength of Automobile Materials 626
Striking Energy of Automobiles 579

Digitized by Google

T

PAGE

Table for the Division of the Circumference 60
Table of Approximate Capacities in Liquid Gallons 60
Table of Comparative Fuel Costs 60
Table of Decimal Equivalents of Vulgar Fractions of an Inch in Common Use 6
Table of Gradients 6
Table of Kilogramme Calories Equivalent to British Thermal Units 6
Tanks—Capacities of, in Liquid Gallons .....
Tanks, Horizontal Cylindrical—Contents of .....
Taps, Standard and S. A. E.—Drill Sizes for .....
Tests—Compression .....
Tests, Malleable Iron 6
Tests of High Quality Nickel Chrome Steel 6
Tests of Parsons Manganese Bronze 62
Tests with British Motor Fuel 603
Thermometer Scales 612
Thermometer Scales—Conversion of 613
Tire Troubles, Pneumatic—Causes of 632
Tires, Clincher—Dimensions of 630
Tires, Metric—American Equivalents of 629
Tires—Proper Loading of 630
Tires, Pneumatic—Air Pressures for Inflating 631
Tires, Pneumatic—Increase in Air Pressures Caused by Driving 631
Tires, Pneumatic—Mileage of 632
Tolerance Table for Radial Ball Bearings 569
Traction Effort on Various Surfaces 577
Transmission Efficiency of Different Types of Mechanism 577

U

United States Official Millimetres Conversion Table 615
United States 60° Thread 640
Useful Engineering Data 599
Useful Functions of π 599

V

Valves, Poppet—Dimensions and Lift of 573
Valves, Poppet—Materials for 625
Viscosity of Gasoline 605

W

Water—Boiling Point of at Various Altitudes 614
Weight in Pounds of Sheet and Bar Aluminum, Brass and Steel 623
Weight of Aluminum, Iron, Copper, Brass and Lead Balls 623
Weight of Flat Steel per Lineal Foot 622
Weights of Metals 621
Wheels, Automobile—Weight of 629
Wheels—Revolutions of at Different Rates of Speed 584
Wheels, Wood—Approximate Diameters for Different Rims 628
Wind Resistance 572
Work done by Clutch and Brakes 578

Y

Yoke and Eye Rod End—S. A. E. Standard 638
π, Useful Functions of 599

INDEX TO NATIONAL AUTOMOBILE AND ALLIED ORGANIZATIONS

Aero Club of America 645
American Automobile Association 647
Automobile Chamber of Commerce, Inc. 645
Automobile Trade Credit Association 646
Electric Vehicle Association of America 646
Federation of American Motorcyclists 648
Motor and Accessory Manufacturers 646
National Association of Engine and Boat Manufacturers 648
National Gas Engine Association 648
Society of Automobile Engineers 646

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Complete Vehicles

PART I

Classified Lists of the Manufacturers of Automobiles and Commercial Vehicles

Index to classifications in this section appears on page 8

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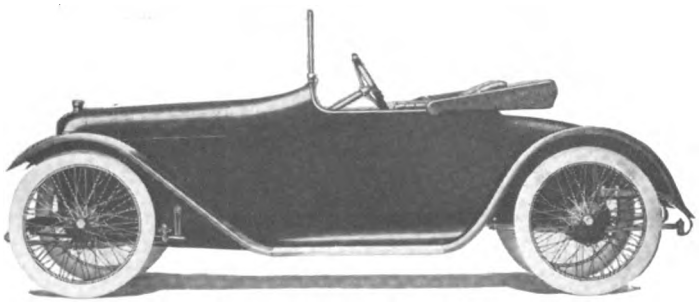
Announcing—

Fischer

DETROIT, MICH.

Biggest "Light" Cars
One Standard Chassis
Models—5—Models
Bodies and Equipment Interchangeable

56 in. Tread



104 in. Wheelbase

Electrically Started and Lighted, 4-Cylinder Water Cooled Motor, Unit Power Plant

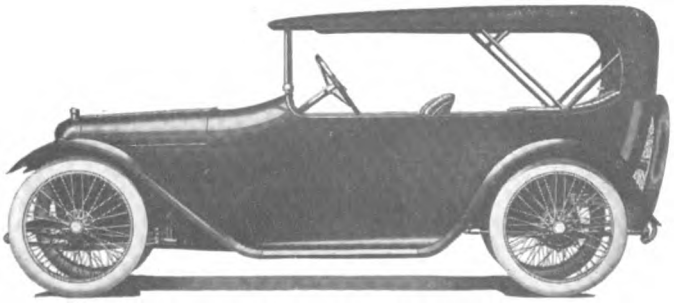
Model A—2 Passenger Speedster, Houk Wire Wheels	$595.00	F.O.B. Factory
Model B—2 Passenger Tourist, Staggard Spoke Wheels		
30" x 3" Standard Auto Tires		
Model C—2 Passenger Cabriolet, Staggard Spoke Wheels	$645.00	F.O.B. Factory
Model D—4 Passenger, one-door, Tourist, Staggard Spoke Wheels		
Model E—4 Passenger Sedan, Staggard Spoke Wheels	$845.00	
31" x 3½" Standard Auto Tires		

Houk Detachable Wire Wheels furnished optional, $30.00 extra

(Equipment Standard) Electric Generator and Battery, Starting and Lighting, Speedometer, Extra Rim, Top, Envelope and Windshield, Completely Equipped. No extras.

Dealers the car is "Right," the price is "Right," the discount is "Right," our contracts are "Right." Why don't you get in "Right"? All you have to do is to "Write," Wire or Call on us.

C. J. FISCHER COMPANY, DETROIT



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Part I

COMPLETE VEHICLES

PLEASURE VEHICLES

GASOLINE VEHICLES

ABBOTT-DETROIT—See Abbott Motor Co.

ABBOTT Motor Car Co., 650 Waterloo St., Detroit, Mich. "Abbott-Detroit."

ALLEN Motor Co., Fostoria, O.

AMALGAMATED Motors Corp., 400 S. Raymond Ave., Alhambra, Cal.

AMERICAN Voiturette Co., Lawton Ave. & M. C. R. R., Detroit, Mich. "Keeton," "Car-Nation."

AMES Motor Car Co., Owensboro, Ky.

APPERSON Bros. Automobile Co., Kokomo, Ind. "Jack Rabbit."

AUBURN Automobile Co., Auburn, Ind.

AUSTIN Automobile Co., 82-104 S. Division St., Grand Rapids, Mich.

BAKER-BELL Motor Co., 665-69 N. Broad St., Philadelphia, Pa.

BARTHOLOMEW Co. (Prospect Heights), Peoria, Ill. "Glide."

BELMONT Motor-Vehicle Co., Green St., Castleton, N. Y.

BRIGGS-DETROITER Co., 537 Holbrook Ave., Detroit, Mich. "Detroiter." (See page 193.)

BRISCOE Motor Co., Jackson, Mich. (See page 193.)

BUCKEYE Mfg. Co., 154 Columbus Ave. Anderson, Ind. "Lambert."

BUICK Motor Co., Hamilton Ave., Flint, Mich.

BURNS Bros., Havre de Grace, Md.

CADILLAC Motor Car Co., 1343 Cass Ave., Detroit, Mich.

CAR-NATION—See American Voiturette Co.

CARROLL Motor Car Co., Main St., Strasburg, Pa.

CARTERCAR Co., Pontiac, Mich.

CASE, T. M., Co., J. I., State St., Racine, Wis.

CHADWICK Engineering Works, Keim St., Pottstown, Pa.

CHALMERS Motor Co., E. Jefferson Ave. & New Belt Line, Detroit, Mich.

CHANDLER Motor Car Co., Cleveland, O. (See page 193.)

CHEVROLET Motor Co., Flint, Mich.

CINCINNATI Motors Mfg. Co., 1743-45 Central Ave., Cincinnati, O.

CLEBURNE Motor Car Mfg. Co., Cleburne, Tex.

COLE Motor Car Co., Indianapolis, Ind. (See page 197.)

CRAWFORD Automobile Co., Surrey & Summit Aves., Hagerstown, Md.

CRESCENT Motor Co., Cincinnati, O.

CROW Motor Car Co., Main & Simonton Sts., Elkhart, Ind.

CROWN Motor Car Co., 131 N. Third St., Louisville, Ky.

CUNNINGHAM, Son & Co., James, 18 Canal St., Rochester, N. Y.

DAVIS Motor Car Co., Geo. W., 11th & E. Sts., Richmond, Ind.

DAY Automobile Co., 25 Milwaukee Ave., E., Detroit, Mich.

DETROITER—See Briggs-Detroiter Co.

DORRIS Motor Car Co., 4100 Laclede Ave., St. Louis, Mo.

DUSSEAU Fore & Rear Drive Auto Co., 310 Erie St., Toledo, O.

ELKHART Carriage & Harness Mfg. Co., Elkhart, Ind. "Pratt."

EMPIRE Automobile Co., 560 Capitol Ave., Indianapolis, Ind. (See page 305.)

Complete Index to Classification appears on Pages 8 to 26.

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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

ENGER Motor Car Co., 2100 Gest St., Cincinnati, O.

F-A-L Auto Co., 4060-4100 Princeton Ave., Chicago, Ill.

F-S Motors Co., 2500 First Ave., Milwaukee, Wis.

F-I-A-T Co., Poughkeepsie, N. Y.

FIRESTONE—See New Columbus Buggy Co.

FISCHER Co., C. J., Detroit, Mich. (See page 32.)

FORD Motor Co., Woodward Ave., Detroit, Mich.

FOUR Wheel Drive Auto Co., Clintonville, Wis.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRANKLIN Mfg. Co., H. H., 101 W. Marcellus St., Syracuse, N. Y.

GLIDE—See Bartholomew Co.

GRANT Motor Co., Findlay, O.

GREAT Southern Automobile Co., Third Ave. & Eighth St., Birmingham, Ala.

GREAT Western Automobile Co., Peru, Ind.

HAVERS Motor Car Co., 1701 Elmwood St., Port Huron, Mich.

HAYNES Automobile Co., 11 Main St., Kokomo, Ind. (See page 125.)

HENDERSON Motor Car Co., Indianapolis, Ind.

HERFF-BROOKS Corp., 250 N. Pennsylvania St., Indianapolis, Ind.

HOWARD—See Lexington Howard Co.

HUDSON Motor Car Co., Jefferson Ave. & Connors Creek, Detroit, Mich.

HUPMOBILE—See Hupp Motor Car Co.

HUPP Motor Car Co., Mt. Elliott & Milwaukee Aves., Detroit, Mich. "Hupmobile."

IMPERIAL Automobile Co., Jackson, Mich. (See page 545.)

INTER-STATE Automobile Co., Muncie, Ind.

INTERNATIONAL Harvester Corp., Akron, O.

JACK RABBIT—See Apperson Bros., Automobile Co.

JACKSON Automobile Co., E. Main & Horton Sts., Jackson, Mich.

JEFFERY Co., Thomas B., Kenosha, Wis. (See page 133.)

KEARNS Motor Truck Co., Beavertown, Pa.

KEETON—See American Voiturette Co.

KING Motor Car Co., 1300-04 Jefferson Ave., Detroit, Mich. (See page 133.)

KISSEL KAR—See Kissel Motor Car Co.

KISSEL Motor Car Co., 121 Kissel Ave., Hartford, Wis. "Kissel Kar."

KLINE Motor Car Corp., Richmond, Va.

KNOX Motors Co., 53 Wilbraham Rd., Springfield, Mass.

K-R-I-T Motor Car Co., Mt. Elliott Ave. & E. Grand Blvd., Detroit, Mich.

L. P. C. Motor Co., Racine, Wis. "Lewis."

LAMBERT—See Buckeye Mfg. Co.

LENOX Motor Car Co., Hyde Park, Mass.

LEWIS—See L. P. C. Motor Co.

LEXINGTON Howard Co., Connersville, Ind. "Howard." (See page 309.)

LOCOMOBILE Co. of America, 2 Main St., Bridgeport, Conn.

LOZIER Motor Co., Mack Ave., Detroit, Mich.

LUVERNE Automobile Mfg. Co., Maple & McKenzie Sts., Luverne, Minn.

LYONS ATLAS Co., Indianapolis, Ind. (See page 357.)

McFARLAN Motor Car Co., Connersville, Ind.

McINTYRE Co., W. H., Auburn, Ind.

MARATHON Motor Works, Clinton St. & 12th Ave., Nashville, Tenn.

MARION Motor Car Co., Oliver Ave. & Drover St., Indianapolis, Ind.

MARMON—See Nordyke & Marmon Co.

MASON Motor Co., 130 Maytag Station, Waterloo, Ia.

MAXWELL Motor Co., Detroit, Mich. (See page 197.)

MERCER Automobile Co., 500 Whitehead Rd., Trenton, N. J.

METZ Co., Waltham, Mass. (See page 305.)

MITCHELL-LEWIS Motor Co., Racine, Wis. (See page 125.)

MOLINE Automobile Co., 300 Palmer St., East Moline, Ill. (See page 197.)

MONARCH Motor Car Co., 1528 Jefferson Ave., Detroit, Mich.

MOON Motor Car Co., St. Louis, Mo. (See page 133.)

MORSE Motor Car Co., Brookline, Mass.

MOTOR Car Co., 811 W. 13th St., Sioux Falls, S. Dak.

MOTOR Car Mfg. Co., Box 584, Indianapolis, Ind. "Pathfinder," "Parry." (See page 309.)

MOYER, H. A., Park & Wolf Sts., Syracuse, N. Y.

NATIONAL Motor Vehicle Co., 1020 E. 22d St., Indianapolis, Ind.

NEW COLUMBUS Buggy Co., Dublin Ave., Columbus, O. "Firestone."

NORDYKE & Marmon Co., 1101-31 W. Morris St., Indianapolis, Ind. "Marmon."

NORWALK Motor Car Co., Martinsburg, W. Va.

NYBERG Automobile Works, Anderson, Ind.

OAKLAND Motor Car Co., Pontiac, Mich. (See page 37.)

OLDS Motor Works, Lansing, Mich. "Oldsmobile."

OLDSMOBILE—See Olds Motor Works.

OVERLAND—See Willys-Overland Co.

PACKARD Motor Car Co., N. Grand Blvd. & Belt Line, Detroit, Mich.

PAIGE-DETROIT Motor Car Co., Detroit, Mich. (See page 547.)

PARRY—See Motor Car Mfg. Co.

PATERSON Co., W. A., Flint, Mich. (See page 545.)

PATHFINDER—See Motor Car Mfg. Co.

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Overland

$1075

(Model 80)
F. O. B. Toledo

The Latest and Greatest Overland of All

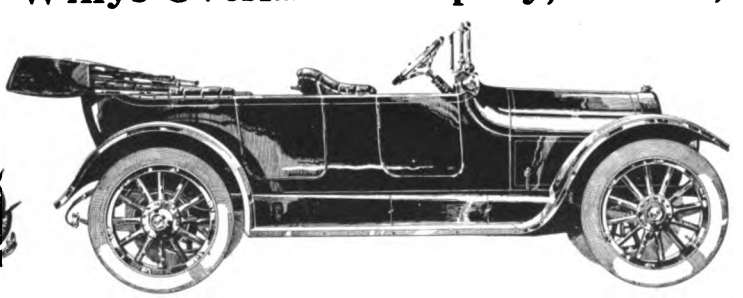
Motor; 35 h. p.
More economical
New full stream-line body
Tonneau; longer and wider
Greater comfort
Instrument board in cowl dash
Individual front seats, high backs
Upholstery; deeper and softer
Windshield; rain vision, ventilating type, built-in
Crowned fenders
Electric starter

Electric lights
Electric horn
All electric switches on steering column
High-tension magneto—no dry cells necessary
Thermo-syphon cooling—no pump needed
Five-bearing crankshaft
Rear-axle; floating type
Rear springs; extra long, and underslung, 3/4 elliptic
Easier riding

Wheel base; 114 inches
Larger tires; 34 inch x 4 inch
Demountable rims—one extra
Left-hand drive
Center control
Body:—beautiful new
Brewster green finish
Mohair top and boot
High-grade magnetic speedometer
Robe rail, foot rest and curtain box

Handsome 1915 catalogue on request. Please address Dept. 142

The Willys-Overland Company, Toledo, O.



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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

PEERLESS Motor Car Co., Quincy Ave. & S. E. 93d St., Cleveland, O.

PETREL Motor Car Co., First & Oklahoma Aves., Milwaukee, Wis.

PIERCE Arrow Motor Car Co., 1695 Elmwood Ave., Buffalo, N. Y.

PILOT Motor Car Co., Richmond, Ind.

PITTSBURGH Motors Co., First Nat'l Bank Bldg., Pittsburg, Pa.

POPE-HARTFORD—See Pope Mfg. Co.

POPE Mfg. Co., 436 Capital Ave., Hartford, Conn. "Pope-Hartford."

PRATT—See Elkhart Carriage & Harness Mfg. Co.

PREMIER Motor Mfg. Co., Indianapolis, Ind.
(See page 153.)

PULLMAN Motor Car Co., York, Pa.
(See page 193.)

R-C-H Corp., 138 Lycaste St., Detroit, Mich.

RAYFIELD Motor Co., Chrisman, Ill.

REGAL Motor Car Co., 201 Piquette Ave., Detroit, Mich.

REO Motor Car Co., Lansing, Mich.

REPUBLIC Motor Car Co., Hamilton, O.

ROYAL Tourist Car Co., L. S. & M. S. Ry. & E. 72d St., Cleveland, O.

S. G. V. Co., N. Eighth St., Reading, Pa.

ST. LOUIS Motor Truck Co., 4274-76 Easton Ave., St. Louis, Mo.

SALTER Motor Co., Wm. A., 1516-18 Oakland Ave., Kansas City, Mo.

SAXON Motor Co., 1305 Bellevue Ave., Detroit, Mich.

SEBRING Motor Car Co., Sebring, O.

SELDEN Motor Vehicle Co., University Ave. & Probert St., Rochester, N. Y.

SIMPLEX Automobile Co., New Brunswick, N. J.

SOUTHERN Auto & Equipment Co., 92-94 S. Forsythe St., Atlanta, Ga.

SPAULDING Mfg. Co., Grinnell, Ia.

SPEEDWELL Motor Car Co., Dayton, O.
(See page 305.)

SPOERER'S Sons Co., Carl, 901-09 S. Carey St., Baltimore, Md.

STAFFORD Motor Car Co., 22d & Campbell Sts., Kansas City, Mo.

STEARNS Co., F. B., Cleveland, O.
(See page 309.)

STERLING Motor Co., 705 Centre St., Brockton, Mass.

STEVENS-DURYEA Co., Chicopee Falls, Mass.
(See page 133.)

STUDEBAKER Corp., Detroit, Mich.

STUTZ Motor Car Co., 430-32 N. Capitol Ave., Indianapolis, Ind.

TOURAINE Co., Broad & Huntington Sts., Philadelphia, Pa.

TRIUMPH Motor Car Co., 3308 Sheffield Ave., Chicago, Ill.

UNITED States Carriage Co., 309-19 S. Fourth St., Columbus, O.

VELIE Motor Vehicle Co., Moline, Ill.

VULCAN Mfg. Co., 475 Richmond St., Painesville, O.

W. F. S. Motor Car Co., 4224 Ludlow St., Philadelphia, Pa.

WAHL Motor Co., 3087 E. Grand Blvd., Detroit, Mich.

WASHINGTON Motor Car Co., Hyattsville, Md.

WAYNE Works, 16th & F. Sts., Richmond, Ind.

WESTCOTT Motor Car Co., 12th & N. E. Sts., Richmond, Ind.

WHITE Co., Cleveland, O.

WICHITA Falls Motor Co., Wichita Falls, Tex.

WILLYS-OVERLAND Co., Toledo, O. "Overland."
(See page 35.)

WINTON Motor Car Co., 10601 Berea Rd., Cleveland, O.

ZIMMERMAN Mfg. Co., 411 Indiana Ave., Auburn, Ind.

ELECTRIC VEHICLES

AMERICAN Electric Car Co., 1215 S. Jefferson Ave., Saginaw, Mich. "Argo," "Broc," "Borland."

ANDERSON Electric Car Co., Detroit, Mich. "Detroit."
(See page 153.)

ARGO—See American Electric Car Co.

BAILEY & Co., S. R., 895 Boylston St., Boston, Mass.

BAKER Motor Vehicle Co., Edgewater Park & L. S. & M. S. Ry., Cleveland, O.

BORLAND—See American Electric Car Co.

BROC—See American Electric Car Co.

BUFFALO Electric Vehicle Co., 1227 Main St., Buffalo, N. Y.

CENTURY Electric Car Co., Detroit, Mich.
(See page 153.)

CHICAGO Electric Motor Car Co., 3612-18 S. Morgan St., Chicago, Ill.

DAYTON Electric Car Co., Fourth & St. Clair Sts., Dayton, O.

DETROIT—See Anderson Electric Car Co.

FIRESTONE—See New Columbus Buggy Co.

FLANDERS Electric, S. Saginaw St., Pontiac, Mich.

FRITCHLE Automobile & Battery Co., 1510-30 Clarkson St., Denver, Colo.

GRINNELL Electric Car Co., 14-16 Atwater St., E., Detroit, Mich.

NEW COLUMBUS Buggy Co., Dublin Ave., Columbus, O. "Firestone."

OHIO Electric Car Co., 1501-07 W. Bancroft St., Toledo, O.

RAUCH & Lang Carriage Co., 2180 W. 25th St., Cleveland, O.
(See page 153.)

STANDARD Car Mfg. Co., Park Ave., Jackson, Mich.

WAVERLEY Co., 139 S. East St., Indianapolis, Ind.

WOODS Motor Vehicle Co., Cottage Grove, Calumet & 25th St., Chicago, Ill.

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A Big Year for Oakland Dealers

The beautiful new Oakland, built around the famous efficient Oakland-Northway motor, with the 51 distinct improvements and refinements this year, is in for a sales season that will smash all records.

See the New

Oakland

A Complete Line of Fours and Sixes
Five Models, - $1150 to $1685

New Oakland Features That Make It the Big Seller This Year:

Increased Power — Improved Oakland-Northway power plant with increased power and silence, extra large valves, Tungsten steel, special designed manifolds and throttle valve.

Beauty of Body Lines—Distinctive and exclusive New Oakland full stream line body, unbroken curves from radiator to rear seat, clean sides, broad aluminum covered running boards and heavy crown fenders.

Roominess and Comfort—Extra leg room in all models for driver and passengers, extra wide deep seats.

Road Efficiency—Low center of gravity without decreased road clearance. New Oaklands hug the road and are easy to handle.

V-Shaped German Silver Radiator: Plenty of water room for long tours, enhanced beauty.

Add to these the elimination of half the oil cups, latest Standard Delco starting, lighting and ignition system, automatic spark advance, non-skid tires in rear, Oakland one-man top and other features, and you will understand how Oakland beauty is backed up by thorough car building. If you are in open territory, we have a liberal proposition for you.

SEE THE NEW OAKLAND

Oakland Motor Car Company
Pontiac, Mich.

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PLEASURE VEHICLES (Continued)

STEAM VEHICLES

ROSS, Louis S., 38 Crafts St., Newtonville, Mass.

STANLEY Motor Carriage Co., Hunt St., Newton, Mass.

CYCLECARS

AMERICAN Cyclecar Co., Connecticut & Florence Aves., Bridgeport, Conn. "Trumbull."

AMERICAN Voiturette Co., Lawton Ave. & M. C. R. R., Detroit, Mich. "Car-Nation."

AUTOMOBILE Cycle Car Co., Wayne Co. Bank Bldg., Detroit, Mich. "Tiger."

CAR-NATION—See American Voiturette Co.

CRESSON-MORRIS Co., 18th St. & Allegheny Ave., Philadelphia, Pa. "Duryea."

DETROIT Cycle Car Co., Free Press Bldg., Detroit, Mich.

DURYEA—See Cresson-Morris Co.

FALCON Cyclecar Co., Staunton, Va.

IMP—See McIntyre Co.

INTERNATIONAL Cycle-Car & Accessories Co., T1100 Security Bldg., Chicago, Ill. "Woods Mobilette."
(See page 197.)

LA VIGNE Cyclecar Co., 641 Commonwealth Ave., Detroit, Mich.

LITTLE PRINCESS—See Princess Cyclecar Co.

LOS ANGELES Cycle Car Co., 612 S. Olive St., Los Angeles, Cal.

MC INTYRE Co., W. H., Auburn, Ind. "Imp."

MALCOLM Cyclecar Co., Plymouth, Mich.

MERZ Cyclecar Co., 1419 South Eastern Ave., Indianapolis, Ind.

O-WE-GO Car Co., Owego, N. Y.

PRINCESS Cyclecar Co., 790 Woodward Ave., Detroit, Mich. "Little Princess."

RAYFIELD Motor Co., Chrisman, Ill.

REX Motor Co., Labadie St. (Ford City), Wyandotte, Mich.

SALVADOR Motor Co., 126 Massachusetts Ave., Boston, Mass.
(See page 545.)

SCRIPPS-BOOTH Cyclecar Co., 1020-30 Beaufait Ave., Detroit, Mich.

STICKNEY Co., Charles A., St. Paul, Minn.

TIGER—See Automobile Cycle Car Co.

TRUMBULL—See American Cyclecar Co.

TWOMBLY Car Corp., 1790 Broadway, New York, N. Y.

WOODS MOBILETTE — See International Cycle-Car & Accessories Co.

ZIP Cyclecar Co., Second & Warren Sts., Davenport, Iowa.

IMPORTED VEHICLES

ADAMS-LANCIA Co., 235 W. 58th St., New York, N. Y. "Lancia."

AUSTRIAN-DAIMLER—See Healey & Co.

BENZ Auto Import Co., 250 W. 54th St., New York, N. Y. "Gaggenau."

BREWSTER & Co., Queensboro Bridge Plaza, Long Island City, N. Y. "Delauney-Belleville."

CAVALIERI, R. A., 103 W. 57th St., New York, N. Y. "Napier."

CLEMENT-BAYARD—See LaCroix Auto Co.

CRYDER & Co., 583 Park Ave., New York, N. Y. "Leon Bollee."

DAIMLER Mfg. Co., 1784 Broadway, New York, N. Y.

DARRACQ—See Ducasse & Co., Henry.

DE DION-BOUTON Selling Branch, 1649 Broadway, New York, N. Y.

DELAUNEY-BELLEVILLE—See Brewster & Co.

DEMAREST & Co., A. T., Broadway & 57th St., New York, N. Y. "Itala."

DUCASSE & Co., Henry, 733 Seventh Ave., New York, N. Y. "Darracq."

FIAT Automobile Co., 1776 Broadway, New York, N. Y.

GAGGENAU—See Benz Auto Import Co.

HEALEY & Co., Broadway & 51st St., New York, N. Y. "Austrian-Daimler," "Panhard."

ISOTTA Fraschini Motors Co., 1920 Broadway, New York, N. Y.

ITALA—See Demarest & Co., A. T.

LA CROIX Auto Co., Paul, 1770 Broadway, New York, N. Y. "Clement-Bayard," "Zedel."

LANCIA—See Adams-Lancia Co.

LEON BOLLEE—See Cryder & Co.

MERCEDES Repair Co., 159 E. 54th St., New York, N. Y.

METALLURGIQUE Motor Co., 1876 Broadway, New York, N. Y.

MOTO-BLOC Import Co., 2008 Broadway, New York, N. Y.

NAPIER—See Cavalieri, R. A.

PANHARD—See Healey & Co.

PEUGEOT Auto Import Co., 59th St. & Fifth Ave., New York, N. Y.

RENAULT Selling Branch, 1770 Broadway, New York, N. Y.

S. P. O. Automobile Co., 244 W. 49th St., New York, N. Y.

ZEDEL—See La Croix Auto Co.

ZUST Motor Co., 235-37 W. 50th St., New York, N. Y.

COMMERCIAL VEHICLES

GASOLINE VEHICLES

A & R—See Abendroth & Root Mfg. Co.

ABENDROTH & Root Mfg. Co., 48A Church St., New York, N. Y. "A. & R."

ADAMS Bros. Co., Findlay, O.

ÆTNA Motor Truck Co., Detroit, Mich.
(See page 43.)

ALMA Motor Truck Co., Alma, Mich. "Republic."

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DENBY

THE new 1500 pound Denby Truck has everywhere been acclaimed as the one truck which meets the largest demand in the commercial field.

Built and sold by the most experienced Motor Truck organization in America.

Dealers, write—we have an attractive proposition for you.

The Denby Motor Truck Co.

Detroit, Mich.

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COMMERCIAL VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

ATTERBURY Motor Car Co., Hertel & Elmwood Aves., Buffalo, N. Y.

AUBURN Motor Chassis Co., Auburn, Ind.

AUGLAIZE Motor Car Co., New Bremen, O.

AUTOCAR Co., Ardmore, Pa.

AVAILABLE Truck Co., 1539 N. 47th Ave., Chicago, Ill.

AVERY Co., Peoria, Ill.

BAKER-BELL Motor Co., 665-69 N. Broad St., Philadelphia, Pa.

BARKER, C. L., Norwalk, Conn.

BARTHOLOMEW Co. (Prospect Heights), Peoria, Ill.

BECK & Son, 901-03 First Ave. W., Cedar Rapids, Ia.

BESSEMER Motor Truck Co., Grove City, Pa.

BLAIR Mfg. Co., Newark, O.

BOWLING Green Motor Car Co., Bowling Green, O. "Modern."

BOYD & Bro., James, 25th & Wharton Sts., Philadelphia, Pa.

BROCKWAY Motor Truck Co., 106 Railroad St., Cortland, N. Y.

BROOKS-LATTA Automobile Mfg. Co., 4255 Fairfax Ave., St. Louis, Mo.

BUCKEYE Mfg. Co., 154 Columbus Ave., Anderson, Ind.

BUICK Motor Co., Hamilton Ave., Flint, Mich.

BUFFALO Auto-Truck & Motor Co., Sussex St., Buffalo, N. Y.

CARROLL Motor Car Co., Main St., Strasburg, Pa.

CHASE Motor Truck Co., Syracuse, N. Y. (See page 41.)

CHICAGO Pneumatic Tool Co., Fisher Bldg., Chicago, Ill. "Little Giant."

CINCINNATI Motors Mfg. Co., 1743-45 Central Ave., Cincinnati, O.

CLARK, Edward S., 242 Freeport St. (Dorchester), Boston, Mass.

CLARK Delivery Car Co., 76th St. & Greenwood Ave. (Grand Crossing), Chicago, Ill.

CLEBURNE Motor Car Mfg. Co., Cleburne, Tex.

COLEMAN Motor Truck Co., Morgan & Main Sts., Ilion, N. Y.

COMMERCE Motor Car Co., 625-30 Penobscot Bldg., Detroit, Mich. (See page 45.)

CONTINENTAL Truck Mfg. Co., 1702 16th St., Superior, Wis.

CORBITT Automobile Co., Henderson, N. C.

COUPLE-GEAR Freight-Wheel Co., 1450 Buchanan St., Grand Rapids, Mich.

CRAWFORD Automobile Co., Surrey & Summit Aves., Hagerstown, Md.

CRESCENT Motor Co., Cincinnati, O.

CROW Motor Car Co., Main & Simonton Sts., Elkhart, Ind.

CROWN Commercial Car Co., North Milwaukee, Wis. (See page 43.)

CURTIS—See Pittsburg Machine Tool Co.

DAIN Mfg. Co. of Iowa, Ottumwa, Ia.

DART Motor Truck Co., Ainsborough & Stratford Aves., Waterloo, Ia.

DAYTON Auto Truck Co., 725 E. First St., Dayton, O.

DENBY Motor Truck Co., Detroit, Mich. (See page 39.)

DETROIT-WYANDOTTE Motor Co., Wyandotte, Mich. "Horner."

DORRIS Motor Car Co., 4100 Laclede Ave., St. Louis, Mo.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. "Vulcan." (See page 527.)

DURANT-DORT Carriage Co. (Flint Motor Wagon Dept.), Flint, Mich. (See page 309.)

DUSSEAU Fore & Rear Drive Auto Co., 310 Erie St., Toledo, O.

EASTERN Power Truck Co., 341-49 Eddy St., Providence, R. I.

ERIE Motor Truck Mfg. Co., 220 W. 12th St., Erie, Pa.

F-A-L Auto Co., 4060-4100 Princeton Ave., Chicago, Ill.

F-S Motors Co., 2500 First Ave., Milwaukee, Wis.

FARGO Motor Car Co., 1164-66 W. 22d St., Chicago, Ill.

FEDERAL Motor Truck Co., Detroit, Mich.

FOUR Wheel Drive Auto Co., Clintonville, Wis.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRONT Drive Motor Co., 16th St. & Willow Ave., Hoboken, N. J.

GABRIEL Auto Co., 315 Prospect Ave. W., Cleveland, O.

GENERAL Motors Truck Co., Pontiac, Mich.

GENEVA Automobile Co., 145 Castle St., Geneva, N. Y.

GRAMM-BERNSTEIN Co., Lima, O.

GRAMM Motor Truck Co., Lima, O.

GREAT Southern Automobile Co., Third Ave & Eighth St., Birmingham, Ala.

HARDER Auto-Truck Co., 40th St. & Calumet Ave., Chicago, Ill.

HARRISON Co., Robert, 324-38 W. First St., (S. Boston), Boston, Mass.

HARVEY Motor Truck Works, Harvey, Ill.

HARWOOD-BARLEY Mfg. Co., Marion, Ind.

HERCULES Motor Truck Co., First & L Sts. (S. Boston), Boston, Mass.

HEWITT—See International Motor Co.

HORNER—See Detroit-Wyandotte Motor Co.

ICE Mfg. Co., 1480 Broadway, New York, N. Y.

INTERNATIONAL Harvester Corp., Akron, O.

INTERNATIONAL Motor Co., 64th St. & West End Ave., New York, N. Y. "Mack," "Saurer," "Hewitt."

JEFFERY Co., Thomas B., Kenosha, Wis. (See page 133.)

KEARNS Motor Truck Co., Beavertown, Pa.

KELLY-SPRINGFIELD Motor Truck Co., Burt & Sheridan Sts., Springfield, O.

KING Mfg. Co., A. R., Kingston, N. Y.

Complete Index to Classification appears on Pages 8 to 26.

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KOSMATH
½ Ton Delivery Wagon

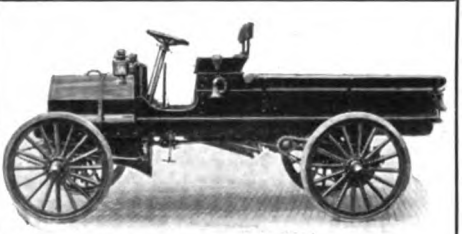
Model 14—$960 Panel Body

ANY TYPE OF BODY FURNISHED. UNIT POWER PLANT. 3 SPEED SLIDING GEARS. EISEMAN MAGNETO

BUILT FOR HARD SERVICE

"Ask the man who owns more than one"

THE KOSMATH COMPANY
708 FORD BUILDING
Detroit, Mich.



This Brand New Chase Will Bring You A New Kind Of Business

Here's a truck that is going to open a new field for sales—an almost limitless field—a field that will ultimately become the most profitable in the trade.

For the new Model S Chase—1000 lb. capacity, at $750—is designed especially to replace the single horse-drawn wagon—to save money for the man who believes that he cannot possibly deliver more cheaply than now.

It is selling in great numbers to small businesses—selling quickly and easily on its great economy of operation;—its extreme simplicity of construction; its proven reliability; its low upkeep cost.

Get into this new field and make money. Write us today for full particulars about the new Model S.

CHASE MOTOR TRUCK CO.
SYRACUSE, N. Y.
Makers of
CHASE MOTOR TRUCKS
1000 lb.; 1500 lb.; 2500 lb.; 4000 lb., and 6000 lb. Models

STANDARD OF OHIO

MANUFACTURERS OF

1, 1½, 2 and 3½ Ton Motor Trucks

Write for our Standard of Ohio Book on Motor Trucks

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Factory and Main Office
WARREN, OHIO

Sales Office
1824 Euclid Ave., CLEVELAND, O.

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COMMERCIAL VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

KISSEL Motor Car Co., 121 Kissel Ave., Hartford, Wis.

KLINE Motor Car Corp., Richmond, Va.

KNICKERBOCKER Motor Truck Mfg. Co., River Ave. & 151st St., New York, N. Y.

KNOX Motors Co., 53 Wilbraham Rd., Springfield, Mass.

KOPP Motor Truck Co., 49 E. Utica St., Buffalo, N. Y.

KOSMATH Co., 708 Ford Bldg., Detroit, Mich. (See page 41.)

KREBS Commercial Car Co., Clyde, O.

KRICKWELL Motor Truck Co., 1373 E. 55th St., Chicago, Ill.

LANDSHAFT & Son, Wm., 2900-10 Donbin Terrace, Chicago, Ill.

LAUTH-JUERGENS Motor Car Co., Fremont, O.

LANGE Motor Truck Co., 145 S. St. Clair St., Pittsburg, Pa.

LIPPARD-STEWART Motor Car Co., 1738 Elmwood Ave., Buffalo, N. Y.

LITTLE GIANT—See Chicago Pneumatic Tool Co.

LOCOMOBILE Co. of America, 2 Main St., Bridgeport, Conn.

McINTYRE Co., W. H., Auburn, Ind.

MACCAR Truck Co., Scranton, Pa.

MACK—See International Motor Co.

MAIS Motor Truck Co., Indianapolis, Ind.

MARATHON Motor Works, Clinton St. & 12th Ave., Nashville, Tenn.

MARMON—See Nordyke & Marmon Co.

MARTIN Carriage Works, York, Pa.

MASON Motor Co., 130 Maytag Station, Waterloo, Ia.

MAXWELL Motor Co., Detroit, Mich. (See page 197.)

MENOMINEE—See Poyer & Co.

MERCHANTS Automobile Co., 2014 Sheffield Ave., Chicago, Ill.

MERCURY Mfg. Co., 4110 S. Halsted St., Chicago, Ill.

METROPOLITAN Automobile Works, 2971 State St., Chicago, Ill.

MILWAUKEE—See Smith Co.

MODERN—See Bowling Green Motor Car Co.

MOGUL Motor Truck Co., 6100 Maple Ave., St. Louis, Mo.

MONITOR Automobile Works, 207 N. Academy St., Janesville, Wis.

MORA Power Wagon Co., 5320-28 St. Clair Ave., Cleveland, O.

MORELAND Motor Truck Co., 1701 N. Main St., Los Angeles, Cal.

MORSE Motor Car Co., Brookline, Mass.

MOTOKART Co., 1790 Broadway, New York, N. Y. (See page 305.)

MOTOR Car Co., 811 W. 13th St., Sioux Falls, S. Dak.

NATCO—See National Motor Truck Co.

NATIONAL Motor Truck Co., Bay City, Mich. "Natco."

NELSON & Le Moon, 815 N. Kedzie Ave., Chicago, Ill.

NORDYKE & Marmon Co., 1101-31 W. Morris St., Indianapolis, Ind. "Marmon."

NYBERG Automobile Works, Anderson, Ind.

OHIO Mfg. Co., Upper Sandusky, O.

OVERLAND—See Willys-Overland Co.

OWOSSO Motor Co., Owosso, Mich.

PACKARD Motor Car Co., N. Grand Blvd. & Belt Line, Detroit, Mich.

PACKERS Motor Truck Co., Wheeling, W. Va.

PALMER-MOORE Co., 110 N. Geddes St., Syracuse, N. Y.

PEERLESS Motor Car Co., Quincy Ave. & S. E. 93d St., Cleveland, O.

PETREL Motor Car Co., First & Oklahoma Aves., Milwaukee, Wis.

PIERCE Arrow Motor Car Co., 1695 Elmwood Ave., Buffalo, N. Y.

PITTSBURG Machine Tool Co., Braddock, Pa. "Curtis."

PLYMOUTH Motor Truck Co., Plymouth, O.

POPE Mfg. Co., 436 Capital Ave., Hartford, Conn.

POYER & Co., D. F., Broadway & Saxton Ave., Menominee, Mich. "Menominee."

PRATT, Carter, Sigsbee & Co., 772 Howard St., Detroit, Mich.

REO Motor Car Co., Lansing, Mich.

REPUBLIC—See Alma Motor Truck Co.

ROBINSON Motor Truck Co., Second Ave. & Seventh St., Minneapolis, Minn.

ROWE Motor Mfg. Co., Downingtown, Pa.

ST. LOUIS Motor Truck Co., 4274-76 Easton Ave., St. Louis, Mo.

SALENTINE-LIBBY & Co., Milwaukee, Wis.

SANDOW Truck Co., 3751-55 Wentworth Ave., Chicago, Ill.

SANFORD Motor Truck Co., W. Fayette St. & St. Marks Pl., Syracuse, N. Y.

SAURER—See International Motor Co.

SAYERS & Scovill Co., 2247-61 Colerain Ave., Cincinnati, O.

SCHLEICHER Motor Vehicle Co., Ossining, N. Y.

SCHLOTTERBACK Mfg. Co., L. E., Fourth Ave. & Ogden St., Newark, N. J.

SELDEN Motor Vehicle Co., University Ave. & Probert St., Rochester, N. Y.

SERVICE Motor Car Co., Wabash, Ind.

SIEBERT Motor Truck Co., 530 Ontario St., Toledo, O.

SIGNAL Motor Truck Co., Detroit, Mich. (See page 43.)

SMITH Co., A. O., Milwaukee, Wis. "Milwaukee." (See page 373.)

SPEEDWELL Motor Car Co., Dayton, O. (See page 305.)

SPOERER'S Sons Co., Carl, 901-09 S. Carey St., Baltimore, Md.

STANDARD Motor Truck Co., Detroit, Mich. (See page 43.)

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The

CROWN TRUCK
For 1914
HAS WORM DRIVE

Mr. Dealer: Buyers are *demanding* worm drive because it means *silence, neatness, efficiency* and *greater power.* You can cash in on this demand with the **Crown Truck.** The **Crown** will enable you to meet the fiercest competition in your field and have talking points as good as your biggest rivals.

Not only is the worm drive a point in your favor, but there are other advantages, such as single high-tension spark Bosch magneto, long-stroke motor, four-speed selective transmission, left drive, center control, etc. These make the **Crown** a good sales proposition.

Then the fact that the **Crown** does the work of commerce at a surprisingly low cost per mile **keeps** it sold.

WRITE FOR OPEN TERRITORY—NOW

Crown Commercial Car Co.

NORTH MILWAUKEE, WIS.

ÆTNA
WORM-DRIVE-TRUCKS

"The Expert Truck"

Standard Parts---Universally Approved

Compare Quality, Efficiency and Price

1½ Ton, $2150 **2½ Ton, $2400**

ÆTNA TRUCKS combine simplicity, durability and economy. They are built for you, as we would expect you to build a truck for us, using the most universally approved parts.

SPECIFICATIONS

Power Plant, Three point suspension. Hazard Motors, Sheldon Axles and Springs, Imported David Brown Worm and Gear, Brown-Lipe Transmission, Ross Steering Gear, Eiseman Automatic Magneto, Schebler Model R. Automatic Carburetor, Standard Adjustable Taper Roller Universal Joints, Left Hand Drive, Center Control.

OUR DEALERS PROPOSITION AND DETAILED CATALOGUE WILL INTEREST YOU. WRITE US TO-DAY.

ÆTNA MOTOR TRUCK CO.

Detroit Mich.

Standard

THREE TON
MOTOR TRUCKS

$2750

Here is the truck that established a new standard of truck value. It embodies such well-known "quality" as Continental Motor, Timken Axles, etc.

Get a catalog.

Standard Motor Truck Co.

Detroit, Mich.

SIGNAL
ONE TON MOTOR TRUCKS

WORM DRIVE—CHAIN DRIVE

Built of Standard Parts Throughout

Timken Axles and Bearings, Continental Motor, Gemmer Steering Gear, Detroit Springs, Covert Transmission, Russel Jack Shaft.

A Full Line of Open and Closed Bodies

Worm Drive Chassis, $1,500
Chain Drive Chassis, $1,400

Signal Motor Truck Company

DETROIT, U. S. A.

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COMMERCIAL VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

STANDARD Motor Truck Co., 1824 Euclid Ave., Cleveland, O. (See page 41.)

STAPF & Co., John M., 228 Central Ave., Dunkirk, N. Y.

STEARNS Co., F. B., Cleveland, O. (See page 309.)

STEGEMAN Motor Car Co., 606 Linus St., Milwaukee, Wis.

STERNBERG Mfg. Co. (W. Allis), Milwaukee, Wis.

STEWART Motor Corp., Superior & Randall Sts., Buffalo, N. Y.

STUDEBAKER Corp., Detroit, Mich.

SULLIVAN Motor Car Co., 1703 East Ave., Rochester, N. Y.

TEEL Mfg. Co., Medford, Mass.

TIFFIN Wagon Co., Tiffin, O.

TOEPPNER Bros., Bay City, Mich.

TRABOLD Truck Mfg. Co., 810-12 Railroad St., Johnstown, Pa.

TRANSIT Motor Car Co., Jackson & Lampton Sts., Louisville, Ky.

TRIUMPH Motor Car Co., 3308 Sheffield Ave., Chicago, Ill.

TULSA Automobile & Mfg. Co., 20 W. Third St., Tulsa, Okla.

UNITED States Carriage Co., 309-19 S. Fourth St., Columbus, O.

UNITED States Motor Truck Co., 17th & Madison Sts., Covington, Ky.

UNIVERSAL Motor Truck Co., 500 Theodore St., Detroit, Mich.

VAN WINKLE Motor Truck Co., Atlanta, Ga.

VEERAC Motor Co., Anoka, Minn.

VELIE Motor Vehicle Co., Moline, Ill.

VULCAN—See Driggs-Seabury Ordnance Corp.

WAGENHALS Motor Car Co., 668-70 Grand River Ave., Detroit, Mich.

WALTER Motor Truck Co., 49-51 W. 66th St., New York, N. Y.

WARE Motor Vehicle Co., 771 Raymond Ave., St. Paul, Minn.

WASHINGTON Motor Car Co., Hyattsville, Md.

WHITE Co., Cleveland, O.

WHITE Star Motor & Engineering Co., 1400 Atlantic Ave., Brooklyn, N. Y.

WICHITA Falls Motor Co., Wichita Falls, Tex.

WILCOX Motor Car Co., H. E., 1030 Marshall St., N. E., Minneapolis, Minn.

WILLYS-OVERLAND Co., Toledo, O. "Overland." (See page 35.)

WINTON Motor Car Co., 10601 Berea Rd., Cleveland, O.

ELECTRIC VEHICLES

AMERICAN Electric Car Co., 1215 S. Jefferson Ave., Saginaw, Mich. "Argo."

ANDERSON Electric Car Co., Detroit, Mich. "Detroit." (See page 153.)

ARGO—See American Electric Car Co.

ATTERBURY Motor Car Co., Hertel & Elmwood Aves., Buffalo, N. Y.

BAKER Motor Vehicle Co., Edgewater Park & L. S. & M. S. Ry., Cleveland, O.

BUFFALO Electric Vehicle Co., 1227 Main St., Buffalo, N. Y.

CHICAGO Electric Motor Car Co., 3612-18 S. Morgan St., Chicago, Ill.

COMMERCIAL Truck Co. of America, 27th & Brown Sts., Philadelphia, Pa.

COUPLE-GEAR Freight-Wheel Co., 1456 Buchanan St., Grand Rapids, Mich.

DAYTON Electric Car Co., Fourth & St. Clair Sts., Dayton, O.

DETROIT—See Anderson Electric Car Co.

FRITCHLE Automobile & Battery Co., 1510-30 Clarkson St., Denver, Colo.

G. V.—See General Vehicle Co.

GENERAL Motors Truck Co., Pontiac, Mich.

GENERAL Vehicle Co., Borden & Review Aves., Long Island City, N. Y. "G. V."

KENTUCKY Wagon Mfg. Co., Third & K Sts., Louisville, Ky. "Urban."

OHIO Electric Car Co., 1501-07 W. Bancroft St., Toledo, O.

URBAN—See Kentucky Wagon Mfg. Co.

WALKER Vehicle Co., 531-45 W. 39th St., Chicago, Ill.

WARD Motor Vehicle Co., E. 143d St. & Concord Ave., New York, N. Y.

WAVERLEY Co., 139 S. East St., Indianapolis, Ind.

IMPORTED VEHICLES

ARIES—See Jaccard & Co.

BENZ Auto Import Co., 250 W. 54th St., New York, N. Y. "Gaggenau."

BUSSING Agency, 1777 Broadway, New York, N. Y.

DE DION-BOUTON Selling Branch, 1649 Broadway, New York, N. Y.

DUCASSE & Co., Henry, 733 Seventh Ave., New York, N. Y. "Orion."

GAGGENAU—See Benz Auto Import Co.

HEALEY & Co., Broadway & 51st St., New York, N. Y. "Panhard."

JACCARD & Co., J., 213 W. 69th St., New York, N. Y. "Aries."

ORION—See Ducasse & Co.

PANHARD—See Healey & Co.

TAXICABS

FORD Motor Co., Woodward Ave., Detroit, Mich.

PULLMAN Motor Car Co., York, Pa. (See page 193.)

THOMAS Motor Cab Co., 184-88 W. Mohawk St., Buffalo, N. Y.

WHITE Co., Cleveland, O.

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SELLING FLEETS OF COMMERCE CARS

Big merchants who began with two and three Commerce Cars are now installing fleets of Commerce Cars as the solution of their delivery problems.

They have tested the Commerce Car as they once tested adding machines and cash registers and found it to be an actual business economy and, consequently, a sound business investment.

Every Commerce Car in operation today is selling Commerce Cars. It's actual performance is its best selling point. Merchants are buying Commerce Cars today on the records of the Commerce Cars operated by their competitors.

This is the fourth year of the Commerce Car. And the enormous demand for the Commerce this year is due, we believe, to our two years of experimenting and testing under the severest possible conditions before we offered the Commerce Car for sale.

Today we know we have the simplest, most dependable, most efficient and most economical delivery car on the market.

And the sale of the Commerce confirms that judgment.

Commerce Car dealers deserve a large share of the credit of Commerce success.

We have selected them very slowly and carefully. They are business men—in the automobile business for consistent growth and permanent, legitimate profits. They have the spirit of the Commerce Motor Car Company. Many of them are pleasure car dealers who have been progressive enough to install a Delivery Car Department and thereby establish a steady twelve-month-a-year business.

They have found the Commerce Car to be precisely all we claimed for it—a single chassis, a single model (that's all we make) "fool-proof" delivery car for which the merchant of the big city and the merchant of the small town have been waiting for ten years.

If you are that kind of a dealer, we want you. Write or wire for details. Better yet, come to Detroit, see the Commerce Car and the Commerce factory and sense the spirit of our whole organization.

The Commerce Motor Car Company

ADMINISTRATION DEPARTMENT

625-630 Penobscot Bldg., Detroit, Mich.

SPECIFICATIONS:

1000-pound capacity, 25 per cent. overload, guaranteed.
Equipment, including electric horn, complete.
32 x 3½ Goodyear pneumatic tire, or 34 x 2½ Goodyear Motz truck tire.
Express, full panel, or canopy top.
Clear floor space—64 inches long; 42 inches wide; 52½ inches high.
Gear ratio—6 to 1 on high; 20 to 1 on low.
Friction drive. Wheelbase—102 inches.

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COMMERICAL VEHICLES (Continued)

MOTOR PROPELLED FIRE APPARATUS

ADAMS Bros. Co., Findlay, O.

AHRENS-FOX Fire Engine Co., Alfred & Cook Sts., Cincinnati, O.

AMERICAN-LA FRANCE Fire Engine Co., Elmira, N. Y.

ANDERSON Coupling & Fire Supply Co., Sixth St. & Reynolds Ave., Kansas City., Kans.

AUTOCAR Co., Ardmore, Pa.

BOYD & Bro., Jas., 25th & Wharton Sts., Philadelphia, Pa.

COUPLE-GEAR Freight-Wheel Co., 1450 Buchanan St., Grand Rapids, Mich.

FEDERAL Motor Truck Co., Detroit, Mich.

HOWE Engine Co., Indianapolis, Ind.

KELLY-SPRINGFIELD Motor Truck Co., Burt & Sheridan Sts., Springfield, O.

KISSEL Motor Car Co., 121 Kissel Ave., Hartford, Wis.

KNOX Motors Co., 53 Wilbraham Rd., Springfield, Mass.

LIPPARD-STEWART Motor Car Co., 1738 Elmwood Ave., Buffalo, N. Y.

LOCOMOBILE Co. of America, 2 Main St., Bridgeport, Conn.

LUITWEILER Pumping Engine Co., 123 Ames St., Rochester, N. Y.

MARTIN Carriage Works, York, Pa.

NOTT Fire Engine Co., 1624 Central Ave., Minneapolis, Minn.

OLDS Motor Works, Lansing, Mich.

PACKARD Motor Car Co., N. Grand Blvd. & Belt Line, Detroit, Mich.

PEERLESS Motor Car Co., Quincy Ave. & S. E. 93d St., Cleveland, O.

POPE Mfg. Co., 436 Capital Ave., Hartford, Conn.

ROBINSON Fire Apparatus Mfg. Co., 4250-68 N. 20th St., St. Louis, Mo.

ROCHESTER Motor Fire Pump Co., Granite Bldg., Rochester, N. Y.

SEAGRAVE Co., Columbus, O.

WATEROUS Engine Works Co., 62 S. Robert St., St. Paul, Minn.

WHITE Co., Cleveland, O.

THE AUTOMOBILE TRADE DIRECTORY'S

Mailing List

Embraces the entire purchasing power, representing every phase of the automobile and motor truck industries.

It contains the names and addresses of all Automobile, Commercial Vehicle, Cycle Car and Motor manufacturers, together with the names of their Engineers, Purchasing Agents, Superintendents and other officials.

It also gives names and addresses of all Dealers or Agents for Automobiles and Motor Trucks, together with names of cars and trucks handled. Also the names and addresses of all Garages, Repair Shops, Charging Stations and of the Dealers and Jobbers of Supplies.

With this list at your command you can circularize the "Ford" dealers or the agents for any other particular make of car or truck. You can "follow up" a town, a city, a state, the United States or the whole North American continent and—you can rest assured that your mail matter—all of it—is addressed to only live and legitimate concerns. Write us for sample sheets and particulars.

THE AUTOMOBILE TRADE DIRECTORY

241-243 West 39th Street New York

Complete Index to Classification appears on Pages 8 to 26.

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Accessories, Parts, Materials and Supplies

PART II

Classified lists of the Manufacturers of Component Parts, Accessories, Materials and Supplies

A complete index to classifications appears on pages 8 to 26

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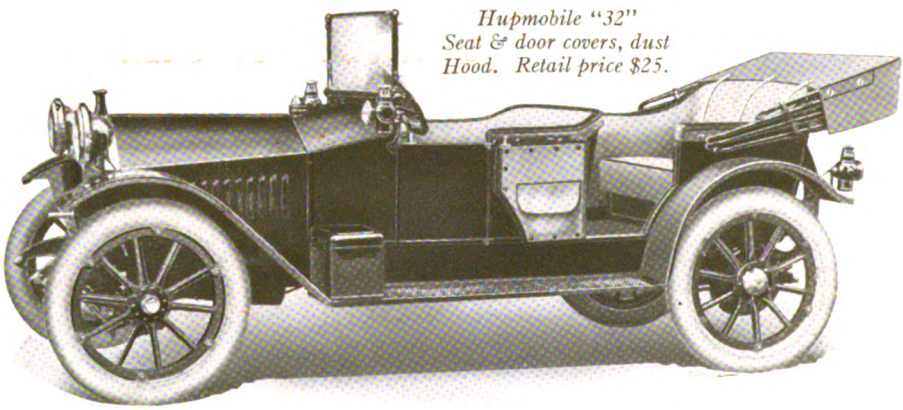
CAMPBELL ESTABLISHED 1879

Guaranteed Motor Car Accessories



Hupmobile "32"
Seat & door covers, dust Hood. Retail price $25.

"Tailor-made" seat covers that really fit and wear—They're Campbell's

As a selling proposition Campbell Seat Covers have no equal. They "deliver the goods" in fit, wear and looks. They are the best money can buy, and they're backed by Campbell.

Every set is guaranteed to fit like a glove, to wear well and hold its shape and color. One glance shows the difference between Campbell's and cheaper imitations. One month's wear *proves* the difference. Three grades; stock sizes for all leading makes and models. Special proposition to the trade.

Write for catalog showing seat covers, carburetor, Percama, shock absorbers, straps, etc. Whether you are a dealer or a car owner, get this catalog today. Address

THE PERKINS CAMPBELL CO.
634 Broadway, Cincinnati, Ohio.
New York Office. 106 Chambers St., New York City.

$12 Buys this New Ford Carburetor: Ready to attach

This is the Johnson Model "D" Carburetor for Fords. Once installed it needs no adjustment. Accelerates like a rabbit; throttles down to a whisper; can't be made to "choke." More miles per gallon, fewer dollars per initial investment. It'll make a new car out of a Ford. Special trade discounts.

Auto tops cleaned for 25c.

A quart of Percama, the heavy fabric cleaner costs 25c. It will clean a big top, a set of seat covers, a big rug. Non explosive; can't hurt waterproof materials; really cleans. ½ gal., 40c.; gal., 60c. Discounts to trade.

THE PERKINS CAMPBELL CO.,
Cincinnati, O.

"Campbell makes sure you're satisfied"

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Part II

PARTS AND ACCESSORIES

ACID

BATTERY ACID

(See Electrolyte, Battery)

SOLDERING ACID

(See Flux, Soldering)

ADAPTERS

ELECTRIC LAMP ADAPTERS

(For converting gas or oil lamps into electric lamps)

APELCO—See Apple Electric Co.

APPLE Electric Co., Newark, N. J. "Apelco."

ARSENO Electric Co., 819A Boylston St., Boston, Mass.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Comet."

FAW, J. H., 41 Warren St., New York, N. Y. "Fawsco." (See page 281.)

FAWSCO—See Faw, J. H.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GENERAL Electric Co., Schenectady, N. Y.

GIL-BO—See Metal Specialties Mfg. Co.

GRAY & Davis, Boston, Mass. (See page 231.)

HAMMER Co., E. A., 1839 Euclid Ave., Cleveland, O.

HANDY—See Chicago Electric Mfg. Co.

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Gil-Bo."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco." (See page 139.)

S-H.—See Stuart-Howland Co.

STUART-HOWLAND Co., 131-41 Federal St., Boston, Mass. "S-H."

ALARMS

BOILER ALARMS

(See Columns, Water)

TIRE ALARMS

(For sounding an alarm when tires are under or over inflated)

GEM—See Safety Tire Signal Co.

POLO Tire Alarm Co., 930 Great Northern Bldg., Chicago, Ill. (See page 363.)

SAFETY Tire Signal Co., 655 12th St., Boulder, Colo. "Gem."

TERPENING, E. A., Mokena, Ill.

ALCOHOL

DENATURED ALCOHOL

JEFFERSON Distilling & Denaturing Co., New Orleans, La. "Radico."

PYRO—See United States Industrial Alcohol Co.

RADICO—See Jefferson Distilling & Denaturing Co.

UNITED States Industrial Alcohol Co., 27 William St., New York, N. Y. "Pyro."

WOOLNER Distilling Co., ft. Spillman St., Peoria, Ill.

Complete Index to Classification appears on Pages 8 to 26.

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ALUMINUM

SHEET AND ROD ALUMINUM

(For Aluminum Castings—See Castings, Aluminum)
(For Aluminum Tubing—See Tubing, Aluminum)

ALUMINUM Co. of America, Pittsburg, Pa.

AMMETERS

STANDARD AMMETERS AND VOLTMETERS

(For switchboard and electric vehicle use. For Pocket Meters—See Gauges, Battery)

CLARK Electric Meter Co., 219 S. Clinton St., Chicago, Ill.

GENERAL Electric Co., Schenectady, N. Y.

HOSKINS Mfg. Co., 453 Lawton Ave., Detroit, Mich. "International."

HOYT Electrical Instrument Works, Penacook, N. H.
(See page 527.)

INTERNATIONAL—See Hoskins Mfg. Co.

JEWELL Electrical Instrument Co., 810 W. Lake St., Chicago, Ill.

KEYSTONE Electrical Instrument Co., Ninth St. & Montgomery Ave., Philadelphia, Pa.

NORTON Electrical Instrument Co., Manchester, Conn.

PIGNOLET, Louis M., 78 Cortlandt St., New York, N. Y.

QUEEN-GRAY Co., 616-18 Chestnut St., Philadelphia, Pa.

RELIANCE Instrument Co., 1135 Van Buren St., Chicago, Ill.

ROLLER-SMITH Co., 203-05 Broadway, New York, N. Y.

TROY Electrical Co., River & State Sts., Troy, N. Y.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTERN Electric Co., 463 West St., New York, N. Y.

WESTON Electrical Instrument Co. (Waverly Park), Newark, N. J.
(See page 499.)

ANNUNCIATORS

AUTOMOBILE ANNUNCIATORS

(For signaling from passenger to driver. For Speaking Tubes—See Tubes, Speaking. For Limousine Telephones—See Telephones, Limousine)

COWLES & Co., C., New Haven, Conn.
(See page 463.)

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

ANTI-RATTLERS

DOOR ANTI-RATTLERS

COLE, Frank, 162 Perry St., Pontiac, Mich

N. E. Auto Door Bumper Co., Rindge Ave. (N. Cambridge), Cambridge, Mass.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

ASBESTOS

SHEET ASBESTOS

(For Asbestos Packing—See Packing, Asbestos)

AMBESCO—See American Asbestos Co.

AMERICAN Asbestos Co., Norristown, Pa. "Ambesco."
(See page 355.)

CAREY Co., Philip (Lockland), Cincinnati, O.

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

KEASBEY & Mattison Co., Ambler, Pa.

NATIONAL Asbestos Co., Lena & Armat Sts. (Germantown), Philadelphia, Pa.

WATSON Co., H. F., Erie, Pa.

AXLES

CYCLECAR AXLES
(Front and Rear)

(For Axle Forgings—See Forgings, Drop.)

AUTOMOBILE Construction & Engineering Co., 3224 Ludlow St., Philadelphia, Pa.
(See page 335.)

BICAR—See Engineering Equipment Co.

DETROIT Axle Co., 231-35 16th St., Detroit, Mich.

ENGINEERING Equipment Co., State Life Bldg., Indianapolis, Ind. "Bicar."

INDIANAPOLIS Drop Forging Co., Madison Ave. & Downing St., Indianapolis, Ind.

WARNER Mfg. Co., Toledo, O.
(See page 405.)

FRONT AXLES

AMERICAN Ball-Bearing Co., Cleveland, O.
(See page 285.)

AMERICAN Gear & Mfg. Co., S. Park Ave., Jackson, Mich.

BILLINGS & Spencer Co., Hartford, Conn.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

DUNLAP Mfg. Co., Columbus, O.

E.-C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

Complete Index to Classification appears on Pages 8 to 26.

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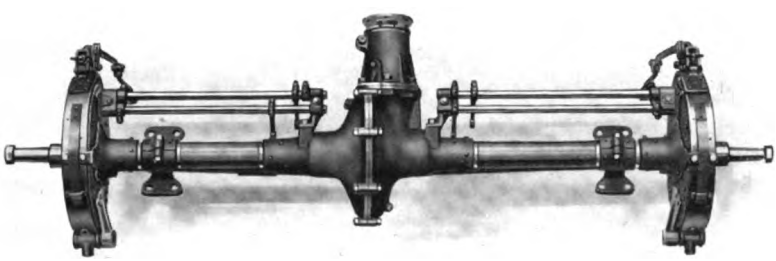
WESTON-MOTT AXLES

FLINT, MICH.

Weston-Mott Popular Model Axle for Five-Passenger, 25 to 30 h.p. Cars, Weighing from 2300 to 2600 Pounds



Construction is regular Weston-Mott standard, three-quarter floating, on Hyatt bearings. The axle shafts are chrome nickel steel, double heat treated.

The illustration shows the axle built for Hotchkiss drive, but it can be furnished with either long or short torque member and any type of drive that the car manufacturer might specify.

This model is the great bulk of our production and has been thoroughly tried out, as we have been manufacturing this type for a number of years. It is at present being furnished to such companies as the Buick, Oakland, Oldsmobile, Empire, Allen, Touraine and Inter-State.

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AXLES (Continued)

FRONT AXLES (Continued)

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 429.)

GREENVILLE Steel Car Co., Greenville, Pa.

HESS Spring & Axle Co., Carthage, O.

HIGGINS Spring & Axle Co., 1314 16th St., Racine, Wis.
(See page 395.)

HOUK Mfg. Co., Buffalo, N. Y.

JACOBSON Machine Mfg. Co., Warren, Pa.
(See page 483.)

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 135.)

METAL Products Co., Detroit, Mich.
(See page 485.)

MOTT Wheel Works, Utica, N. Y.
(See page 359.)

MUNCIE Gear Works, Muncie, Ind.

MURRAY Mfg. Co., Park Bldg., Pittsburg, Pa.

OBENBERGER Drop Forge Co., Milwaukee, Wis.
(See page 475.)

PATHFINDER—See Weaver Co.

PERU Auto Parts Mfg. Co., Peru, Ind.

RUSSEL Motor Axle Co., North Detroit, Mich.
(See page opposite last page.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 513.)

SHELDON Axle Co., Wilkes-Barre, Pa.
(See page 283.)

TIMKEN-DETROIT Axle Co., Detroit, Mich.

WALKER-WEISS Axle Co., Flint, Mich.

WEAVER Co., Geo. A., Newport, R. I. "Pathfinder."

WESTERN Spring & Axle Co., 66th St. & Van Kirk Ave., Cincinnati, O.

WESTON-MOTT Co., Flint, Mich.
(See page 51.)

YUSTER Axle Co., Gordon Park, Cleveland, O.
(See page 53.)

REAR AXLES

AMERICAN Ball-Bearing Co., Cleveland, O.
(See page 285.)

AMERICAN Gear & Mfg. Co., S. Park Ave., Jackson, Mich.

DETROIT Axle Co., 231-35 16th St., Detroit, Mich.

DETROIT Standard Gear Co., 742 Woodbridge St., E. Detroit, Mich.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

DUNLAP Mfg. Co., Columbus, O.

E.-C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

EMPIRE Axle Co., Dunkirk, N. Y.
(See page 291.)

HESS Spring & Axle Co., Carthage, O.

HINDLEY Gear Co., 1105 Frankford Ave., Philadelphia, Pa.

HOUK Mfg. Co., Buffalo, N. Y.

JACOBSON Machine Mfg. Co., Warren, Pa.
(See page 483.)

KEYSTONE-HINDLEY Gear Co., Pennsylvania Bldg., Philadelphia, Pa.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 135.)

METAL Products Co., Detroit, Mich.
(See page 485.)

MOTT Wheel Works, Utica, N. Y.
(See page 359.)

RUSSEL Motor Axle Co., North Detroit, Mich.
(See page opposite last page.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 513.)

SHELDON Axle Co., Wilkes-Barre, Pa.
(See page 283.)

TIMKEN-DETROIT Axle Co., Detroit, Mich.

TORBENSON Gear & Axle Co., 228 High St., Newark, N. J.

WARNER Mfg. Co., Toledo, O.
(See page 405.)

WESTON-MOTT Co., Flint, Mich.
(See page 51.)

YUSTER Axle Co., Gordon Park, Cleveland, O.
(See page 53.)

REAR AXLES WITH TRANSMISSION

AMERICAN Gear & Mfg. Co., S. Park Ave., Jackson, Mich.

EVANS—See Merchant & Evans Co.

LINDSAY Auto Parts Co., Meridian Life Bldg., Indianapolis, Ind.

MERCHANT & Evans Co., Philadelphia, Pa. "Evans."

MUNCIE Gear Works, Muncie, Ind.

PERU Auto Parts Mfg. Co., Peru, Ind.

RUSSEL Motor Axle Co., North Detroit, Mich.
(See page opposite last page.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 513.)

BACKS

METAL SEAT BACKS

A-Z Co., 530 W. 56th St., New York, N. Y.

MULLINS Co., W. H., 182 Franklin St Salem, O.

BAGS

COAT RAIL BAGS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y.

ARSENAL Varnish Co., Rock Island, Ill.

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Yuster Axles

WHEN this company was organized in January, 1914, we promised production by April first.

The first shipment was made March 30th.

That indicates efficient organization, promise-keeping, real service.

More than ten million dollars' worth of 1915 automobiles will be equipped with Yuster Axles.

That indicates merit—shown in the engineering details, and proved by actual tests.

To manufacturers planning next year's output we shall be glad to submit blue-prints and specifications, and explain the merits of Yuster Axles.

The Yuster Axle Company

GORDON PARK

CLEVELAND, OHIO U. S. A.

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BAGS (Continued)

COAT RAIL BAGS (Continued)

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

GILBERT Mfg. Co., New Haven, Conn.

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

NATHAN Novelty Mfg. Co., 90 G. Reade St., New York, N. Y. (See page 347.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

WINSHIP, W. W., 71 Summer St., Boston, Mass.

RUBBER GAS BAGS

DAVOL Rubber Co., Providence, R. I.

DIAMOND Rubber Co., Akron, O.

GOODRICH Co., B. F., Akron, O.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

SEAMLESS Rubber Co., New Haven, Conn.

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

TOOL BAGS OR ROLLS

(For Tool Boxes—See Boxes, Tool)

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

CAMPBELL—See Perkins-Campbell Co.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

DAFOE-EUSTICE Co., Jefferson Ave. & Antoine St., Detroit, Mich. "Duk-Bak."

DUK-BAK—See Dafoe-Eustice Co.

ECONOMY Stay Co., Jefferson City, Mo.

EXCELSIOR Bag & Mfg. Co., Troy, N. Y.

FEESER Co., Frank S., 1102 Prospect St., Indianapolis, Ind. "Superior."

GILBERT Mfg. Co., New Haven, Conn.

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

HOPEWELL Bros., Newton, Mass. (See page 97.)

LANDERS Bros. Co., Dept. A, Toledo, O. (See page 443.)

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O.

NATHAN Novelty Mfg. Co., 90 G Reade St., New York, N. Y. (See page 347.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell." (See page 48.)

PLANET Co., Westfield, Mass.

PREMIER Auto Novelty Mfg. Co., 875 W. Broadway, New York, N. Y.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

SUPERIOR—See Feeser Co.

BALLS

STEEL BALLS

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

ATLAS Ball Co., Glenwood Ave. & Second St., Philadelphia, Pa.

AUBURN Ball Bearing Co., 27 Elizabeth St., Rochester, N. Y. (See page 423.)

BANTAM Anti-Friction Co., Bantam, Conn. (Importers.) "H. & H."

BISMARK—See Frasse & Co.

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.) (See page 483.)

D. W. F.—See Frasse & Co.

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "D. W. F.," "Bismark." (See page 219.)

H. & H.—See Bantam Anti-Friction Co.

HOFFMAN—See R. I. V. Co.

JONES Ball Co., Arlington Heights, Mass.

NEW Departure Mfg. Co., Bristol, Conn. (See page 63.)

PRESSED Steel Mfg. Co., Land Title Bldg., Philadelphia, Pa.

R. I. V. Co., 254 W. 57th St., New York, N. Y. (Importers.) "Hoffman."

SMITH, Edwin, Spring City, Pa.

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.

BANDING

BRAKE BANDING OR LINING

(For lining brakes or clutches—See also Leather, Friction; also Belting, Leather; also Fibre, Hard)

AMBESCO—See American Asbestos Co.

AMBLER AUTOBESTOS—See Keasbey & Mattison Co.

AMERICAN Asbestos Co., Norristown, Pa. "Ambesco." (See page 355.)

ARABIAN—See Rossendale-Reddaway Belting & Hose Co.

ASBESTOS & Rubber Works of America, 1790 Broadway, New York, N. Y. "Motobestos." (See page 57.)

ASBESTOS & Rubber Works of New Jersey, Camden, N. J. "Longwear." (See page opposite Inside Back Cover.)

Complete Index to Classification appears on Pages 8 to 26.

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Brake Reliability

Present day requirements of the automobile and motor truck, especially the increasing speeds and powers, make an absolutely reliable and wear-resisting brake essential.

TRADE GARCO MARK

Asbestos Brake Lining

is constructed of the best material known for resisting the heat that is generated in the hard usage of this service. Water or oil will not affect the efficiency of GARCO Lining.

COMPACT—STRONG—WEAR-RESISTING

We also manufacture ASBESTOS CLUTCH LINING and a Full Line of Asbestos Textiles, Asbestos Metallic Sheet Packing, Gaskets and Valve Stem Packing.

GENERAL ASBESTOS AND RUBBER COMPANY

Main Office and Factories:
CHARLESTON, S. C.

Branch: 312 First Avenue
PITTSBURGH, PA.

THERMOID RUBBER CO., Trenton, N. J.

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BANDING (Continued)

BRAKE BANDING OR LINING (Continued)

AXWELL Equipment Co., 421 Wood St., Pittsburg, Pa.

BESTBESTOS—See Federal Asbestos Co.

BLUE EDGE—See Woven Steel Hose & Rubber Co.

CAMEL HAIR — See Rossendale - Reddaway Belting & Hose Co.

CAREY Co., Philip (Lockland), Cincinnati, O. "Enduro."

CHESTERTON Co., A. W., 64 India St., Boston, Mass. "Gripbestos."

CORK Insert Co., 164 Federal St., Boston, Mass.

DIAMOND N—See Norristown Magnesia & Asbestos Co.

EDKIN—See Germann Bronze Co.

ELEKTRA—See Horton Mfg. Co.

EMBESTOS—See Empire Rubber & Tire Co.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J. "Embestos."

ENDURO—See Carey Co.

ERBESTOS Brake Lining Co., 1430 Vine St., Philadelphia, Pa.

ESSEX Rubber Co., Trenton, N. J.

FEDERAL Asbestos Co., Van Houten St., Paterson, N. J. "Bestbestos," "Ford-Bestos."

FORD-BESTOS—See Federal Asbestos Co.

GANDY Belting Co., 728 W. Pratt St., Baltimore, Md.

GARCO—See General Asbestos & Rubber Co.

GENERAL Asbestos & Rubber Co., Charleston, S. C. "Garco."
(See page 55.)

GERMANN Bronze Co., 355 W. 19th St., Erie, Pa. "Edkin."
(See page 489.)

GLOBE—See United & Globe Rubber Mfg. Cos.

GRIPBESTOS—See Chesterton Co.

GRIP-ON—See New York Leather Belting Co.

HORTON Mfg. Co., F. L., 36 Whittier St., Roxbury, Mass. "Elektra."
(See page 419.)

J-M NON-BURN—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M Non-Burn."

KEASBEY & Mattison Co., Ambler, Pa. "Ambler Autobestos."

LONGWEAR—See Asbestos & Rubber Works of New Jersey.

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O.

MOTOBESTOS—See Asbestos & Rubber Works of America.

MULTIBESTOS—See Standard Woven Fabric Co.

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y. "Grip-on."

NORRISTOWN Magnesia & Asbestos Co., Norristown, Pa. "Diamond N."

RAYBESTOS—See Royal Equipment Co.

ROSSENDALE—REDDAWAY Belting & Hose Co., Newark, N. J. "Camel Hair," "Arabian."

ROYAL Equipment Co., 1372 Bostwick Ave., Bridgeport, Conn. "Raybestos," "Stability."
(See page 85.)

RUSCO—See Russell Mfg. Co.

RUSSELL Mfg. Co., Middletown, Conn. "Rusco."

S-M-C—See Staybestos Mfg. Co.

SCANDINAVIA Belting Co., 127-29 White St., New York, N. Y.

STABILITY—See Royal Equipment Co.

STANDARD Brake Lining Co., Gleasondale, Mass.

STANDARD Woven Fabric Co., Framingham, Mass. "Multibestos."
(See page 303.)

STAYBESTOS Mfg. Co. (Germantown), Philadelphia, Pa. "S-M-C."
(See page 57.)

THERMOID Rubber Co., Trenton, N. J.
(See page 55.)

UNITED & Globe Rubber Mfg. Cos., Trenton, N. J. "Globe."

WOVEN Steel Hose & Rubber Co., Trenton, N. J. "Blue Edge."
(See page 531.)

BANDS

NON-SKID BANDS

(See also Treads, Detachable. For Tire Chains—See Chains, Tire)

HERCULES—See Republic Rubber Tire & Shoe Co.

LEATHER Tire Goods Co., Niagara Falls, N. Y. "Woodworth."
(See page 57.)

PERFECTION Non-Skid Climber Co., Edon, O.

REPUBLIC Rubber Tire & Shoe Co., 152 W. 55th St., New York, N. Y. "Hercules."

WOODWORTH—See Leather Tire Goods Co.

BARS

ARCH BARS

(See Supports, Hood)

BASKETS

TOURING BASKETS

(See Hampers, Touring)

BATTERIES

DRY BATTERIES

ACME RAPID FIRE—See Nungesser Carbon & Battery Co.

AMERICAN Carbon & Battery Co., Signal Hill, Ill.

AMERICAN Ever Ready Co., 816 Hudson St., New York, N. Y. "Ever Ready."

Complete Index to Classification appears on Pages 8 to 26.

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Trade

Mark

ASBESTOS

Brake Lining and Clutch Facings

MADE ONLY BY

Asbestos & Rubber Works
OF AMERICA

1790 Broadway, New York

Western Branch

J. H. Gould

1202 Majestic Building
Detroit, Mich.

The
Tire Protectors
That Protect

Centre rivets glass-hard;
Specially-treated chrome leather;
Chafing prevented by stiff side springs, always snug

Woodworth Treads

Woodworth Treads, plus tires, cost about one-third less per mile than tires alone. Literature Free
Good Agents wanted for unoccupied territory

Leather Tire Goods Company
Niagara Falls, N. Y.

STAYBESTOS PRODUCTS

S-M-C ASBESTOS FRICTION FACINGS

We are willing to let S-M-C ASBESTOS FRICTION FACINGS stand comparison with any other in the land on the basis of both quality and price. S-M-C is made from the highest quality asbestos and resistance wire compactly woven and scientifically treated. Absolutely fireproof and practically indestructible. Made in all shapes and sizes.

FORD SPECIAL NON-METALLIC BRAKE LINING

Our non-metallic brake lining for FORD CARS has eliminated all FORD transmission troubles.

Remember that we carry everything that you want that is made from asbestos. Write us.

STAYBESTOS MFG. COMPANY

Germantown, Phila., Pa.

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BATTERIES (Continued)

DRY BATTERIES (Continued)

AUTOCRAT—See Stackpole Carbon Co.

BLUE RIBBON—See Roche Electrical Co.

BULL DOG—See Hi-Po Waterproof Battery Co.

BULL DOG—See Western Dry Battery Co.

BURN-BOSTON Battery & Mfg. Co., 8 Doane St., Boston, Mass.

COLUMBIA—See National Carbon Co.

EASTERN—See National Carbon Co.

EVER READY—See American Ever Ready Co.

FLEUR-DE-LIS—See French Battery & Carbon Co.

FRENCH Battery & Carbon Co., Madison, Wis. "Fleur-de-Lis."

GORDON Primary Battery Co., Waterbury, Conn.

HERCULES—See National Carbon Co.

HI-PO Waterproof Battery Co., 1007 Atlantic Ave., Brooklyn, N. Y. "Bull Dog."

HI-UP—See Manhattan Electrical Supply Co.

HOT SHOT—See National Carbon Co.

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

MANHATTAN Electrical Supply Co., New York, N. Y. "Red Seal," "Hi-Up."

1900—See Nungesser Carbon & Battery Co.

NATIONAL Carbon Co., Cleveland, O. "Red Top," "Columbia," "Eastern," "Hercules," "Standby," "U. S.," "Hot Shot."

NEW STANDARD—See Roche Electrical Co.

NUE—See Union Battery Co.

NUNGESSER Carbon & Battery Co., 1170 E. 38th St., Cleveland, O. "Acme Rapid Fire," "1900."

POWER—See Union Battery Co.

READYSPARK—See U. S. Auto Battery Co.

RED SEAL—See Manhattan Electrical Supply Co.

RED SHIELD—See Wesco Supply Co.

RED STAR—See White Star Battery Co.

RED TOP—See National Carbon Co.

ROCHE Electrical Co., Wm., 487 Greenwich St., New York, N. Y. "Yates-Roche," "New Standard," "Blue Ribbon."

ROCK Island Battery Co., Winton Pl., Cincinnati, O.

STACKPOLE Carbon Co., St. Marys, Pa. "Autocrat," "Wizard."
(See page 481.)

STANDARD Carbon Co., 1151-57 Stanford Ave., Los Angeles, Cal. "Western Ignitor."

STANDBY—See National Carbon Co.

TOPNOTCH—See U. S. Auto Battery Co.

UNION Battery Co., Belleville, N. J. "Nue." "Power."

U. S.—See National Carbon Co.

U. S. Auto Battery Co., 60-62 Warren St., New York, N. Y. "Readyspark," "Top-notch."

WASHINGTON Automobile Supply Co., Washington, Ill.

WESCO Supply Co., Seventh St. & Clark Ave., St. Louis, Mo. "Red Shield."

WESTERN Dry Battery Co., 2225-31 First Ave., S., Seattle, Wash. "Bull Dog."

WESTERN Electric Co., 463 West St., New York, N. Y.

WESTERN IGNITOR—See Standard Carbon Co.

WHITE Star Battery Co., 126 Chambers St., New York, N. Y. "Red Star."

WIZARD—See Stackpole Carbon Co.

YATES-ROCHE—See Roche Electrical Co.

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AMERICAN Storage Battery Co., Cambridge, Mass. "Harvard."

AMPVO Battery Co., 3031 Michigan Ave., Chicago, Ill. "Economy."

APELCO—See Apple Electric Co.

APPLE Electric Co., Newark, N. J. "Apelco."

ASHBROOK, J. F., 2639 Emmet St., Chicago, Ill. "Square," "Satisfaction."

BISON Storage Battery Co., 38 Riley St., Buffalo, N. Y.

BROWN-SMITH Battery Co., Bloomington, Ind.

COMBAT—See Commercial Battery Co.

COMMERCIAL Battery Co., 2106-10 Michigan Ave., Chicago, Ill. "Combat."

COOK Railway Signal Co., Gas & Electric Bldg., Denver, Colo. "Re Vivo."

COSMOS Electric Co., 136 Liberty St., New York, N. Y.

DETROIT Battery Co., 42 W. Larned St., Detroit, Mich.

DOTY Battery Works, R. B., 12217 Euclid Ave., Cleveland, O. "Lawrence."

DURO—See Vivax Storage Battery Co.

ECONOMY—See Ampvo Battery Co.

EDISON Storage Battery Co., 131 Lakeside Ave., Orange, N. J.
(See page 59.)

ELECTRIC Storage Battery Co., Allegheny Ave. & 19th St., Philadelphia, Pa. "Exide," "Hycap-Exide."

ELECTRIC Storage Battery & Mfg. Co., Cincinnati, O. "Hydrox."

ELECTRIC Supply & Battery Co., 7510 Woodland Ave., S. E., Cleveland, O.

ELECTRICAL Engineering & Storage Battery Co., Hume-Mansure Bldg., Sandy Hook, Conn. "Intigral."

ESSEX Storage Battery & Supply Co., 272 Halsey St., Newark, N. J.

EVEREADY Storage Battery Works of National Carbon Co., 514-24 W. 57th St., New York, N. Y. "Midget," "Geiszler."
(See page 419.)

EXIDE—See Electric Storage Battery Co.

FERMOILE-JOHNSON Storage Battery Co., Niagara Falls, N. Y.
(See page 73.)

FIRE FLY—See Hoosier Storage Battery Co.

GEISZLER—See Eveready Storage Battery Works of National Carbon Co.

GENERAL Storage Battery Co., 2005 Locust St., St. Louis, Mo.

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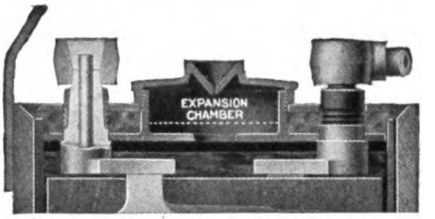

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(See page 59.)

HARVARD—See American Storage Battery Co.

HEISSLER Storage Battery Co., 1436 Michigan Blvd., Chicago, Ill.

HELIOS—See National Carbon Co.

HOBO—See Hoosier Storage Battery Co.

HOOSIER Storage Battery Co., 214 E. Penn. St., Evansville, Ind. "Fire Fly," "Hobo."
(See page 59.)

HUDSON-FULTON—See Storage Battery Supply Co.

HYCAP-EXIDE—See Electric Storage Battery Co.

HYDROX—See Electric Storage Battery & Mfg. Co.

INTIGRAL—See Electrical Engineering & Storage Battery Co.

INVINCIBLE—See American Battery Co.

JEWEL Electric Co., 1467-69 Michigan Ave., Chicago, Ill.

KEELER Battery Co., 134 Ontario St., Toledo, O.

KREMLO—See McCauley Storage Battery Co.

LBA—See Willard Storage Battery Co.

L-C-R Storage Battery Co., 33 S. St. Clair St., Dayton, O.

LAWRENCE—See Doty Battery Works.

McCAULEY Storage Battery Co., 1060 St. Clair Ave., E., Cleveland, O. "Kremlo."

MARKO & Co., Paul M., 1191 Bedford Ave., Brooklyn, N. Y.
(See page 481.)

MASCO—See Milwaukee Auto Specialty Co.

MIDGET—See Eveready Storage Battery Works of National Carbon Co.

MILLER Storage Battery Co., 212 Michigan St., Toledo, O.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium," "Victor," "Masco."
(See page 445.)

MOUND City Battery Co., 17 S. Boyle St., St. Louis, Mo.

MULLER, Albert, Hoffman Blvd. & Hillside Ave., Jamaica, N. Y. "Porox."

MULTIPLE Storage Battery Co., 427 W. 50th St., New York, N. Y.

NATIONAL Carbon Co., Cleveland, O. "Helios."

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill.
(See page 131.)

NORTHWESTERN Storage Battery Co., Milwaukee, Wis.
(See page 493.)

PERFECTION Igniter Mfg. Co., 1175 Bedford Ave., Brooklyn, N. Y.

PERFECTION Storage Battery Co., 2023-25 S. Michigan Ave., Chicago, Ill.

PHILADELPHIA Storage Battery Co., Ontario & C Sts., Philadelphia, Pa.
(See page 499.)

POROX—See Muller, Albert.

PREMIER Electric Co., 4032-42 W. Ravenswood Ave., Chicago, Ill.

PUMPELLY Battery Co., 533-35 N. Capital Ave., Indianapolis, Ind.

RADIUM—See Milwaukee Auto Specialty Co.

RE VIVO—See Cook Railway Signal Co.

RELIABLE—See Storage Battery Supply Co.

RELIANCE—See Storage Battery Supply Co.

REX Battery Co., 2505-09 S. State St., Chicago, Ill.

SATISFACTION—See Ashbrook, J. F.

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SERVICE Battery Co., 2325-27 Wabash Ave., Chicago, Ill.

SILVEY Electric Co., 10-16 S. Canal St., Dayton, O.

SQUARE—See Ashbrook, J. F.

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SWARTZ Electric Co., The Speedway, Indianapolis, Ind.

TITAN Storage Battery Co., Chapel St. & Lister Ave., Newark, N. J.
(See page 491.)

U-S-L—See U. S. Light & Heating Co.

U. S. Light & Heating Co., Niagara Falls, N. Y. "U-S-L."
(See page 389.)

UNIVERSAL Battery Co., 3410-24 S. La Salle St., Chicago, Ill.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

VICTOR—See Milwaukee Auto Specialty Co.

VIVAX Storage Battery Co., 219 E. 24th St., Chicago, Ill. "Duro."

VOLKCAR Storage Battery Co., 2441 Michigan Ave., Chicago, Ill.

WILLARD Storage Battery Co., Cleveland, O. "Lba."
(See page 361.)

WITHERBEE Igniter Co., Springfield, Mass.

ZOAR Battery Co., Zoar, O.

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AUBURN Ball Bearing Co., 27 Elizabeth St., Rochester, N. Y.
(See page 423.)

B. K. F.—See Lehman Mfg. Co.

BALL & Roller Bearing Co., Danbury, Conn.
(See page 423.)

BANTAM Anti-Friction Co., Bantam, Conn.

BARTHEL & Daly, 1790 Broadway, New York, N. Y. (Importers.) "Schafer."
(See page 61.)

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.) "F & S"
(See page 483.)

CLEVELAND Ball Bearing Co., Cleveland, O.
(See page 79.)

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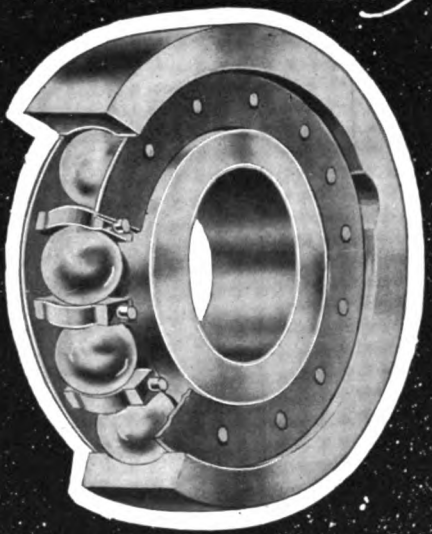

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F & S—See Bretz Co.

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G-A—See German-American Ball Bearing Mfg. Co.

GERMAN-AMERICAN Ball Bearing Mfg. Co., 342-44 N. Sheldon St., Chicago, Ill. "G.-A."

GURNEY Ball Bearing Co., Jamestown, N. Y.
(See page 423.)

H-B—See Hess-Bright Mfg. Co.

HESS-BRIGHT Mfg. Co., Philadelphia, Pa. "H-B," "D. W. F."
(See Front Cover.)

IMPERIAL Bearing Co., Detroit, Mich.

LEHMAN Mfg. Co., J. H., 727 Seventh Ave., New York, N. Y. (Importers.) "B. K. F."

MARBURG Bros., 1790 Broadway, New York, N. Y. (Importers.) "S. R. O."
(See page 423.)

NEW Departure Mfg. Co., Bristol, Conn.
(See page 63.)

NORMA Co. of America, 1790 Broadway, New York, N. Y. (Importers.)

R. B. F.—See Rhineland Machine Works Co.

R. I. V. Co., 254 W. 57th St., New York, N. Y. (Importers.)

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S.R.O.—See Marburg Bros.

SCHAFER—See Barthel & Daly.

STANDARD Machinery Co., Auburn, R. I.
(See page 431.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.

STAR Ball Retainer Co., Lancaster, Pa.
(See page 331.)

SUSPENSION Ball Bearing Co., Sandusky, O.
(See page 431.)

U. S. Ball Bearing Mfg. Co., Oak Park, Ill.
(See page 221.)

ROLLER BEARINGS

AMERICAN Roller Bearing Co., Farmers Bank Bldg., Pittsburg, Pa.

BALL & Roller Bearing Co., Danbury, Conn.
(See page 423.)

BANTAM Anti-Friction Co., Bantam, Conn.

BOCK Bearing Co., Toledo, O.
(See page 77.)

BOWER Roller Bearing Co., Detroit, Mich.
(See page 89.)

GEORGE Automatic Roller Bearing Co., Reutschler Bldg., Hamilton, O.

HYATT Roller Bearing Co., Detroit, Mich.
(See page 301.)

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RAILWAY Roller Bearing Co., 541 Seymour St., Syracuse, N. Y.

STANDARD Machinery Co., Auburn, R. I.
(See page 431.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.

TIMKEN Roller Bearing Co., Canton, O.

REGRINDING OF BALL BEARINGS

AHLBERG Bearing Co., 2644 Michigan Ave., Chicago, Ill.
(See page 77.)

AMERICAN Roller Bearing Co., Farmers Bank Bldg., Pittsburg, Pa.

GWILLIAM Co., Broadway & 58th St., New York, N. Y.

PRUYN Ball Bearing Works, Philadelphia, Pa

PRUYN & Bilodeau, 1876 Broadway, New York, N. Y.
(See page 411.)

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J.

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(For warning signal in place of horn on electric cars)

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EDWARDS & Co., 140th & Exterior Sts., New York, N. Y. "Recti."

LIBERTY Bell Co., 346 The Arcade, Cleveland, O.

P. R. Mfg. Co., 621 Bellevue Ave., Detroit, Mich.

RECTI—See Edwards & Co.

ROUSSEAU, David, Ossining, N. Y.

WESTERN Electric Co., 463 West St., New York, N. Y.

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EAST Hampton Bell Co., East Hampton, Conn.

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(See page 553.)

NEW Departure Mfg. Co., Bristol, Conn.
(See page 63.)

Complete Index to Classification appears on Pages 8 to 26.

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COMBER—See Rahmann & Co.

ENDURMO—See Missouri Belting Co.

G & K—See Graton & Knight Mfg. Co.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K."
(See page 67.)

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa. "Vim."

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JEWELL Belting Co., 55 Trumbull St., Hartford, Conn.

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NATIONAL Leather Belting Co., 342 E. 38th St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich.
(See page 69.)

NEW YORK Leather Belting Co., 51 Beekman St., New York, N. Y.

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PAGE Belting Co., Concord, N. H.

RAHMANN & Co., Geo., 31 Spruce St., New York, N. Y. "Comber."

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CURRY Co., J. W., 2615 Cummins St., Cincinnati, O.

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(See page 65.)

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LOCKWOOD & Dunlap, 1332 Addison Rd., Cleveland, O.

ROYAL Equipment Co., 1372 Bostwick Ave., Bridgeport, Conn.
(See page 85.)

RUSCO—See Russell Mfg. Co.

RUSSELL Mfg. Co., Middletown, Conn. "Rusco."

SEEANDBEE—See Hinson Co.

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(See page 303.)

SPIRAL WIRE BELTS

BIDDISON Mfg. Co., 1516 Williamson St., Madison, Wis. "True Blue."

BULL DOG—See N. Y. Wire & Spring Co.

CALCUTTS—See Gardner Wire Co.

EUREKA Spring Co., 347 W. Broadway, New York, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

GARDNER Wire Co., 48 Race Ave. (Austin Station), Chicago, Ill. "Calcutts."

HEBB, Geo. A., 70 William St., Newark, N. J.

KELLEY, A. F., 178 S. Main St., Providence, R. I. "Kello."

KELLO—See Kelley, A. F.

MORGAN Spring Co., Worcester, Mass.

N. Y. Wire & Spring Co., 586-88 Washington St., New York, N. Y. "Bull Dog."
(See page 395.)

TRUE BLUE—See Biddison Mfg. Co.

WEBB Mfg. Co., ft. Center St., Newark, N. J.
(See page 69.)

V BELTS

(For Flat Belts—See Belting, Leather)

ALGCO—See Auburn Leather Goods Co.

AUBURN Leather Goods Co., Auburn, N. Y. "Algco."

CHIBECO—See Chicago Belting Co.

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CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

COE & Brown, 202-04 George St., New Haven, Conn.

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich. "Flexo."
(See page 69.)

FLEXO—See Detroit Leather Works.

GRATON & Knight Mfg. Co., Worcester, Mass. "Spartan."
(See page 67.)

HIDE, Leather & Belting Co., Indianapolis, Ind. "Wetprufe."
(See page 69.)

KONTAK—See Rahmann & Co.

MONOGRAM—See National Leather Mfg. Co.

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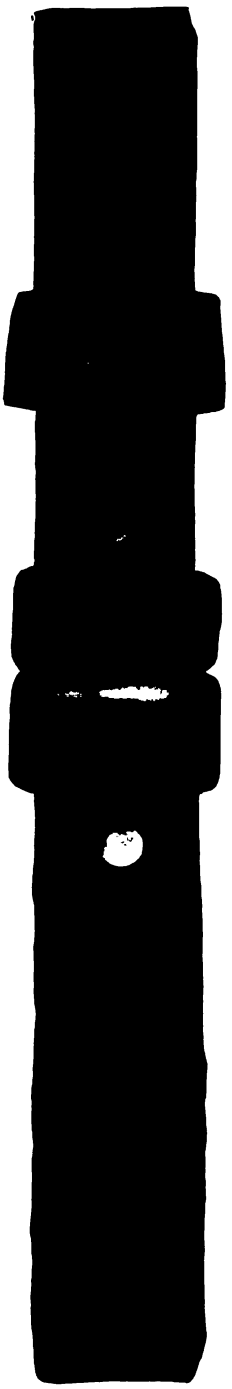

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PAGE Belting Co., Concord, N. H.

PEERLESS-V-BELT Co., Cedar Rapids, Ia.

RAHMANN & CO., Geo., 31 Spruce St., New York, N. Y. "Kontak."

RHOADS & Sons, J. E., 12 N. Third St., Philadelphia, Pa.

SCHIEREN Co., Chas. A., New York, N. Y.

SPARTAN—See Graton & Knight Mfg. Co.

WAKEFIELD Sales Co., Trempealeau, Wis.

WETPRUFE—See Hide, Leather & Belting Co.

CINCINNATI Welt Co., 118 Opera Pl., Cincinnati, O.

LANDERS Bros. Co., Dept. A., Toledo, O. (See page 443.)

WADE Mfg. Co., Brockton, Mass. (See page 361.)

BLANKS

GEAR BLANKS

(See Gears, Blank)

BOARDS

RUNNING BOARDS

(See Steps, Special)

BENDINGS

WOOD BENDINGS

AMERICAN Veneer Co., 1501 Clinton St., Hoboken, N. J. (See page 151.)

AUTO City Bow Co., 441-47 Livernois Ave., Detroit, Mich. (See page 521.)

CAMPBELL & Dann Mfg. Co., Tullahoma, Tenn.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

SHEPARD & Sons, H. G., James & River Sts., New Haven, Conn.

TOLEDO Bending Co., Toledo, O.

TUCKER Wood Work Co., Sidney, O.

WHEEL & Wood Bending Co., 141 John St. Bridgeport, Conn.

BINDING

MAT AND CARPET BINDING

DOUGLAS & Lomason Co., Detroit, Mich. (See page 205.)

ENGLISH & Mersick Co., 154-60 Westchester Ave., New Haven, Conn.

BINDINGS

UPHOLSTERY BINDINGS

BACKSTAY Machine & Leather Co., Union City, Ind.

BAUER-ALDRICH Co., 363 Holden Rd., Detroit, Mich.

BAUER Bros. Mfg. Co., 1035-37 Richmond St., Cincinnati, O.

CASEY Mfg. Co., 216-20 Monroe St., Detroit, Mich. (See page 275.)

BODIES

METAL COMMERCIAL CAR BODIES

ACME Body Co., Rahway, N. J.

ALBERT Bros., 11-13 Cannon St., New York, N. Y

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

ARMSTRONG-JOHNSTON Mfg. Co., W. First Ave. & Perry St., Columbus, O.

AUTO Body Co., Lansing, Mich. (See page 73.)

AUTO Metal Co., 520 Worthington St. Springfield, Mass.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BOWE Carriage Co., 711 Orange St., Wilmington, Del.

BRILL Co., J. G., 62d St. & Woodland Ave., Philadelphia, Pa.

BROWN Auto-Carriage Co., 3147 Superior Ave., Cleveland, O.

BUDD Mfg. Co., Edward G., Ontario & I Sts., Philadelphia, Pa.

CAPITOL Body Co., Ray St. & Madison Ave., Indianapolis, Ind.

CENTRAL Mfg. Co., 18th St. & Georgia Ave., Connersville, Ind.

COLLINS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 500 Central Ave., Newark, N. J.

COMMERCIAL Auto Body & Mfg. Co., 5345 St. Clair Ave., Cleveland, O.

COOLING Carriage Co., 402 French St., Wilmington, Del.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

EUREKA—See Lally Commercial Body Co.

HALE & Kilburn Co., 18th St. & Lehigh Ave., Philadelphia, Pa.

Complete Index to Classification appears on Pages 8 to 26.

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TRADE MARK REG. U. S. PAT. OFF.

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Friction Leathers

Straps, Washers, Packings, etc., may seem like minor factors on your high-class product—but it's often "the little things that count."

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are quality products themselves, and belong with the high-class machines on which they are used.

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Worcester Mass.

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BODIES (Continued)

METAL COMMERCIAL CAR BODIES (Continued)

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., Detroit, Mich.

HIGHLAND Body Mfg. Co. (Elmwood Place), Cincinnati, O.
(See page 75.)

HUTCHCROFT & Sons Co., D. G., Cleveland, O.

IMPERIAL—See Welch & Suthergreen Co.

K-L—See Kingsbury-Leahy Co.

KAHLER Co., N. Vincennes St. & Monon R.R., New Albany, Ind.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa.
(See page 75.)

KINGSBURY-LEAHY Co., 131-33 Hudson Ave., Albany, N. Y. "K-L."
(See page 75.)

LALLY Commercial Body Co., Paris St., Everett, Mass. "Perfection," "Eureka," "Paragon."

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LEITCH Co., James N., Amesbury, Mass.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

METROPOLITAN Auto & Carriage Co., 430-34 Grand St., Bridgeport, Conn.

MIFFLINBURG Body & Gear Co., Mifflinburg, Pa.

MONAHAN Vehicle Co., Kinsley Ave. & Eagle St., Providence, R. I.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

NEW Haven Carriage Co., New Haven, Conn.
(See page 73.)

PARAGON—See Lally Commercial Body Co.

PERFECTION—See Lally Commercial Body Co.

PETERS Wagon & Auto Works, 418-20 Ensor St., Baltimore, Md.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind.
(See page 75.)

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDWACHTER Carriage Co., Park Ave & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 71.)

STEWART Co., W. F., Harriet St., Flint, Mich.

TROY Mfg. Co., Troy, O.

UNITED States Metal Products Co., 111 Broadway, New York, N. Y.
(See page 83.)

WALKER-WELLS Co., Amesbury, Mass.

WELCH & Suthergreen Co., 80 Lunenburg St., Fitchburg, Mass. "Imperial."

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WILLOUGHBY Co., Dwyer Ave. & Turner St., Utica, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

WERNER & Sons, Geo., 133-37 Main St., Waupun, Wis.

METAL PLEASURE CAR BODIES

ABRESCH Co., Chas., Fourth & Poplar Sts., Milwaukee, Wis.

ACME Body Co., Rahway, N. J.

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

AUTO Body Co., Lansing, Mich.
(See page 73.)

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BEAUDETTE Co., O. J., Pontiac, Mich.

BIDDLE & Smart Co., Amesbury, Mass.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BLUE Ribbon Auto & Carriage Co., 1720 Fairfield Ave., Bridgeport, Conn.

BOWE Carriage Co., 711 Orange St., Wilmington, Del.

BREWSTER & Co., Queensboro Bridge Plaza, Long Island City, N. Y.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BRIGGS Mfg. Co., Clay Ave., Detroit, Mich.

BRUNN'S Carriage Mfg. Co., 1140-48 Main St., Buffalo, N. Y.

BRUNN & Co., 980 Ellicott St., Buffalo, N. Y.

BUDD Mfg. Co., Edward G., Ontario & I Sts., Philadelphia, Pa.

CAPITOL Body Co., Ray St. & Madison Ave., Indianapolis, Ind.

CARRIAGE Woodstock Co., Owensboro, Ky.

CENTRAL Mfg. Co., 18th St. & Georgia Ave., Connersville, Ind.

CLARK Carriage Co., Amesbury, Mass.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 500 Central Ave., Newark, N. J.

COOLING Carriage Co., 402 French St., Wilmington, Del.

CUNNINGHAM Son & Co., James, 18 Canal St., Rochester, N. Y.

CURRIER-CAMERON Co., Amesbury, Mass.

CUTTER, J. Frank, 30 Amherst St., Cambridge, Mass.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

DEMAREST & Co., A. T., 453-67 Chapel St., New Haven, Conn.

DETROIT Body Co., Clay & St. Aubin Aves., Detroit, Mich.

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Clutch Facings
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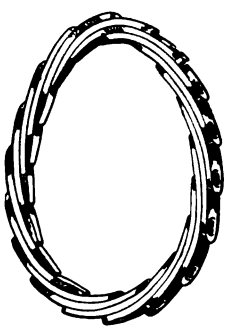

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Great friction surface, smooth action, extreme pliability, strength and wearing quality. Riveted together and made endless with machine screws and nuts. Readily attached and adjusted. Send for sample sections.

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Knuckle Boots, Magneto Covers and Straps
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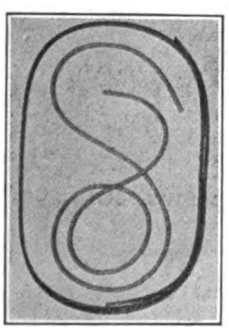

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WIRE BELTS
OF
QUALITY, UNIFORMITY AND DURABILITY
for indicating and recording instruments and mechanical devices of any description
ALSO BUFFING AND POLISHING OUTFITS
Catalogue on request
WEBB MANUFACTURING CO., Foot of Centre St., Newark, N. J.

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BODIES (Continued)

METAL PLEASURE CAR BODIES (Continued)

DUNHAM & Son., D B., Central Ave. & Fourth St., Newark, N. J.

FARNHAM & Nelson Co., 47 Union Ave., Boston, Mass.

FISHER Body Co., St. Antoine St. & M. C. R. R., Detroit, Mich

FITZ GIBBON & Crisp, Trenton, N. J.

FLANDRAU & Co., 205 W. 75th St., New York, N. Y.

FLEETWOOD Metal Body Co., Fleetwood, Pa.

GRISWOLD Motor & Body Co., 660 Commonwealth Ave., Detroit, Mich.

HASSETT & Rogers, Oak St., Amesbury, Mass.

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., Detroit, Mich.

HEALEY & Co., Broadway & 51st St., New York, N. Y.

HERBERT Mfg. Co., 570 Kirby Ave., W., Detroit, Mich.

HOLBROOK Co., West End Ave. & 67th St., New York N. Y.

HOLLANDER & Morrill, Amesbury, Mass.

IRVIN Mfg. Co., R. J., Morris & Division Sts., Indianapolis, Ind.

JUDKINS Co., J. B., Merrimac, Mass.

KAHLER Co., N. Vincennes St. & Monon R. R., New Albany, Ind.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa. (See page 75.)

KIMBALL & Co., O. P., Chicago, Ill. (See page 87.)

KINGSBURY-LEAHY Co., 131-33 Hudson Ave., Albany, N. Y. (See page 75.)

KLINGER, Louis, 745 E. 11th St., New York, N. Y.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LEITCH Co., James N., Amesbury, Mass.

LOCKE & Co., 218-20 W. 84th St., New York, N. Y.

MAC INNIS Bros., 118-22 22d St., Toledo, O.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

MIFFLINBURG Body & Gear Co., Mifflinburg, Pa.

MILBURN Wagon Co., 3134 Monroe St., Toledo, O.

MILLER Bros., Chestnut St., Amesbury, Mass.

MILLER, Hicks & Hewitt, 509-15 W. 56th St., New York, N. Y.

MONROE Body Co., Osmun St., Pontiac, Mich.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

NEW HAVEN Carriage Co., New Haven, Conn. (See page 73.)

PAGE, Samuel K., 60 Franklin St., New Haven, Conn.

PETTINGELL Machine Co., 79 Elm St., Amesbury, Mass.

PORTLAND Body Works, Portland, Ind.

PULLAR Co., James, 5 Mechanic St., Hartford, Conn.

QUINBY & Co., J. M., 21-39 Division St., Newark, N. J.

R. & H. Sheet Metal Co., Abington, Mass.

RACINE Mfg. Co., Sixth & Meade Sts., Racine, Wis.

REID Co., 1603 Second Ave., Moline, Ill.

RICKARDS & McLaughlin Wagon Co., Trenton, N. J.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind. (See page 75.)

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SEAMAN Co., W. S., 486 Virginia St., Milwaukee, Wis.

SPRINGFIELD Metal Body Co., Springfield, Mass. (See page 71.)

STEWART Co., W. F., Harriet St., Flint, Mich.

THOMPSON Co., E. J. (Forbes Field), Pittsburg, Pa.

TROY Mfg. Co., Troy, O.

UNION CITY Body Co., Union City, Ind.

UNITED States Metal Products Co., 111 Broadway, New York, N. Y. (See page 83.)

WALKER Carriage Co., Merrimac, Mass. (See page 73.)

WALKER-WELLS Co., Amesbury, Mass.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WILLOUGHBY Co., Dwyer Ave. & Turner St., Utica, N. Y.

WILSON Body Co., C. R., Clay Ave. & Grand Trunk R. R., Detroit, Mich.

WOOP, Wm., 42-50 W. 67th St., New York, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

WRIGHT Co., Thomas, 71-78 Golden St., Jersey City, N. J.

YORK Wagon Gear Co., York, Pa.

YOUSE Co., E. S., 46 N. Fifth St., Reading, Pa.

ZIMMERMAN & Sons, F. F., Main St., Waupun, Wis.

WOOD COMMERCIAL CAR BODIES

ACME Body Co., Rahway, N. J.

ALBERT Bros., 11-13 Cannon St., New York, N. Y.

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

ARMSTRONG-JOHNSTON Mfg. Co., W. First Ave. & Perry St., Columbus, O.

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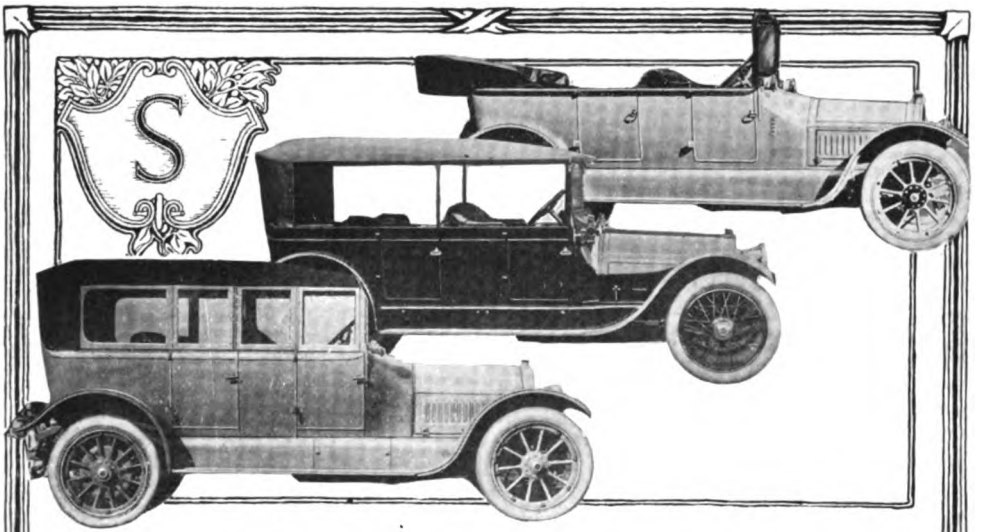

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A SPRINGFIELD CONVERTIBLE BODY
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The $1,200 Springfield Convertible Body is, of course, the finest convertible body possible to build. Its weight, size and appointments are all calculated to correspond with chassis listing from $2,000 or thereabouts—or up to the highest priced.

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SPRINGFIELD MASS.

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BODIES (Continued)

WOOD COMMERCIAL CAR BODIES (Continued)

AUBURN Wheel & Mfg. Co., Auburn, R. I.

AUTO Body Co., Lansing, Mich. **(See page 73.)**

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

BAILEY & Bowne, Whitesboro & Wiley Sts., Utica, N. Y.

BAILY Mfg. Co., York, Pa.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BARRETT Mfg. Co., Peter, 111 Navy St., Brooklyn, N. Y.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BOLLWERK & Bro., H., 3103 S. Broadway, St. Louis, Mo.

BORBEIN Auto Co., 2109-11 N. Ninth St., St. Louis, Mo.

BOWE Carriage Co., 711 Orange St., Wilmington, Del.

BRILL Co., J. G., 62d St. & Woodland Ave., Philadelphia, Pa.

BROWN Auto-Carriage Co., 3147 Superior Ave., Cleveland, O.

BROWNELL & Burt, 12 Washington St., Taunton, Mass.

CHICAGO Carriage & Trimming Co., 1908 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 S. Michigan Ave., Chicago, Ill.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 500 Central Ave., Newark, N. J.

COMMERCIAL Auto Body & Mfg. Co., 5345 St. Clair Ave., Cleveland, O.

COOLING Carriage Co., 402 French St., Wilmington, Del.

COPE Co., 1082-84 Clinton Ave., Irvington, N. J.

CURRIER-CAMERON Co., 35 Elm St., Amesbury, Mass.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DARON Co., Charles K., York, Pa.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

DONIGAN & Nielson, 743-47 Third Ave., Brooklyn, N. Y.

DUNHAM & Son, D. B., Central Ave. & Fourth St., Newark, N. J.

ECONOMY Mfg. Co., 207 W. South St., Indianapolis, Ind.

EUREKA—See Lally Commercial Body Co.

FISHER, A., 300-10 Fort St., W., Detroit, Mich.

FULTON-WALKER Co., 337-45 S. 12th St., Philadelphia, Pa.

GOOLD Co., James, Broadway & Schuyler St., Albany, N. Y.

HASSETT & Rogers, Oak St., Amesbury, Mass.

HIGHLAND Body Mfg. Co. (Elmwood Place), Cincinnati, O. **(See page 75.)**

HOOVER Wagon Co., York, Pa.

IMPERIAL—See Welch & Suthergreen Co.

IRVIN Mfg. Co., R. J., Morris & Division Sts., Indianapolis, Ind.

IRVING Co., Geo., 548 W. 22d St., New York, N. Y.

JEWETT Co., Geo. H., 172-74 Shrewsbury St., Worcester, Mass.

K-L—See Kingsbury-Leahy Co.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa. **(See page 75.)**

KIDNEY Co., James, Cincinnati, O.

KINGSBURY-LEAHY Co., 131-33 Hudson Ave, Albany, N. Y. "K-L." **(See page 75.)**

KOENIG & Luhrs Wagon Co., Quincy, Ill.

LALLY Commercial Body Co., Paris St., Everett, Mass. "Perfection," "Eureka," "Paragon."

LANGE Wagon Co., H., S. St. Clair & Eva Sts., E. E., Pittsburg, Pa.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LONDON Limousine Co., 112-16 Grove St., Hempstead, N. Y.

LOWELL Auto Body Co., Lowell Mich.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

MEDIA Carriage Mfg. Co., Media, Pa.

METROPOLITAN Auto & Carriage Co., 430-34 Grand St., Bridgeport, Conn.

MIFFLINBURG Body & Gear Co., Mifflinburg, Pa.

MILBURN Wagon Co., 3134 Monroe St., Toledo, O.

MILLER Co., E. M., Quincy, Ill.

MONAHAN Vehicle Co., Kinsley Ave. & Eagle St., Providence, R. I.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MOTOR Truck Body Co., 320 Franklin St., Detroit, Mich.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

MULHOLLAND Co., Washington Ave., Dunkirk, N. Y.

NEW Haven Carriage Co., New Haven, Conn. **(See page 73.)**

NIEDERHUT Carriage Co., 3556-62 Walnut St., Denver, Colo.

PARAGON—See Lally Commercial Body Co.

PERFECTION—See Lally Commercial Body Co.

PETERS Wagon & Auto Works, 418-20 Ensor St., Baltimore, Md.

RECH-MARBAKER Co., Eighth St. & Girard Ave., Philadelphia, Pa.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind. **(See page 75.)**

ROEDER Mfg. Co., Fred., 846-72 Grand St., Brooklyn, N. Y.

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

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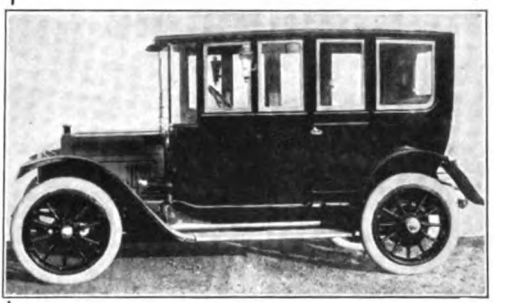

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NEW HAVEN CARRIAGE CO.

NEW HAVEN CONN.

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BODIES (Continued)

WOOD COMMERCIAL CAR BODIES (Continued)

SCHAEFER Wagon Co., Gustav, 4170-80 Lorain Ave., Cleveland, O.

SCHALL, Anton, 403-07 Flushing Ave., Brooklyn, N. Y.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SEBASTIAN Wagon Co., 425 E. 53d St., New York, N. Y.

SHADBOLT Mfg. Co., Flushing Ave. & Cumberland St., Brooklyn, N. Y.

SMITH Carriage Co., R. J., Lake & Lyell Aves., Rochester, N. Y.

TEGETMEIER & Riepe Co., 771-73 First Ave., New York, N. Y.

TROY Mfg. Co., Troy, O.

UHLENHAUT Bros. Wagon Co., 1322-24 Merchant St., St. Louis, Mo.

UNION Wheel Works, 51-55 Stanton St., Newark, N. J.

VALENTINE, J. S., 432-38 Princeton Ave. Trenton, N. J.

VON DOMARUS, Geo., 847 Larrabee St., Chicago, Ill.

WAVERLEY Co., 139 S. East St., Indianapolis, Ind.

WEBER Co., M., 218-20 N. St. Clair St., Dayton, O.

WELCH & Suthergreen Co., 80 Lunenburg St., Fitchburg, Mass. "Imperial."

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WILLOUGHBY Co., Dwyer Ave. & Turner St., Utica, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

WRIGHT Co., Thos., 71-78 Golden St., Jersey City, N. J.

YORK Wagon Gear Co., York, Pa.

YOUSE Co., E. S., 46 N. Fifth St., Reading, Pa.

ZIMMERMAN & Sons, F. F. Main St., Waupun, Wis.

WOOD PLEASURE CAR BODIES

ABRESCH Co., Chas., Fourth & Poplar Sts., Milwaukee, Wis.

ACME Body Co., Rahway, N. J.

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

ARMSTRONG-JOHNSTON Mfg. Co., W. First Ave. & Perry St., Columbus, O.

AUTO Body Co., Lansing, Mich. (See page 73.)

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AUTO Top & Body Co., 257-59 N. Broad St., Philadelphia, Pa.

BAILY Mfg. Co., York, Pa.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BLUE Ribbon Auto & Carriage Co., 1720 Fairfield Ave., Bridgeport, Conn.

BORBEIN Auto Co., 2109-11 N. Ninth St., St. Louis, Mo.

BOWE Carriage Co., 711 Orange St., Wilmington, Del.

BREWSTER & Co., Queensboro Bridge Plaza, Long Island City, N. Y.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BROWNELL & Burt, 12 Washington St., Taunton, Mass.

BRUNN'S Carriage Mfg. Co., 1140-48 Main St., Buffalo, N. Y.

BRUNN & Co., 980 Ellicott St., Buffalo, N. Y.

CAPITOL Body Co., Ray St. & Madison Ave., Indianapolis, Ind.

CARRIAGE Woodstock Co., Owensboro, Ky.

CHICAGO Carriage & Trimming Co., 1903 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 S. Michigan Ave., Chicago, Ill.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 500 Central Ave., Newark, N. J.

COOLING Carriage Co., 402 French St., Wilmington, Del.

CUNNINGHAM Son & Co., James, 18 Canal St., Rochester, N. Y.

CURRIER-CAMERON Co., 35 Elm St., Amesbury, Mass.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

DEMAREST & Co., A. T., 453-67 Chapel St., New Haven, Conn.

EARL Automobile Works, 1320 S. Main St., Los Angeles, Cal.

FARNHAM & Nelson Co., 47 Union Ave., Boston, Mass.

FEHRING Carriage Co., 601-09 Third St., Columbus, Ind.

FISHER, A., 300-10 Fort St., W., Detroit Mich.

FITZ GIBBON & Crisp, Trenton, N. J.

FLANDRAU & Co., 205 W. 75th St., New York, N. Y.

GOOLD Co., James, Broadway & Schuyler St., Albany, N. Y.

GRAVES & Co., G. O., Rahway, N. J.

GREGG-WM. D. ROGERS Co., 1926 Arch St., Philadelphia, Pa.

HASSETT & Rogers, Oak St., Amesbury, Mass.

HAYES & Miller Co., 518-22 E. 57th St., New York, N. Y.

HEALEY & Co., Broadway & 51st St., New York, N. Y.

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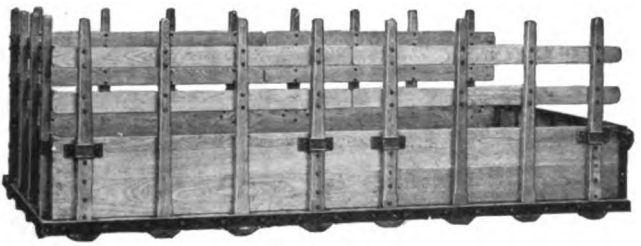

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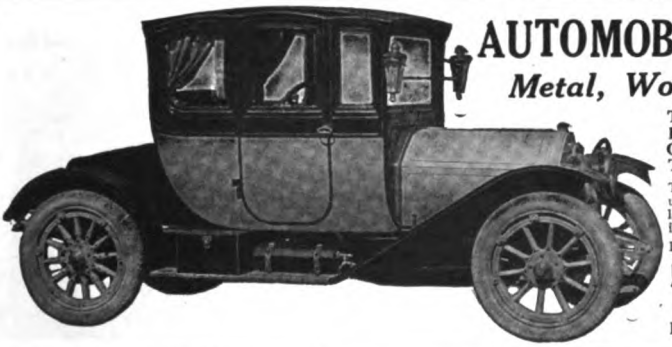

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HUTCHCROFT & Sons Co., D. G., Cleveland, O.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KIMBALL & Co., C. P., Chicago, Ill.
(See page 87.)

KINGSBURY-LEAHY Co., 131-33 Hudson Ave., Albany, N. Y.
(See page 75.)

KLINGER, Louis, 745 E. 11th St., New York, N. Y.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LIMOUSINE-CARRIAGE Mfg. Co., 3515 Michigan Ave., Chicago, Ill.

LOCKE & Co., 218-20 W. 84th St., New York, N. Y.

LOWELL Auto Body Co., Lowell, Mich.

MAC INNIS Bros., 118-22 22d St., Toledo, O.

MANHATTAN Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MANN-ALDRICH Carriage Co., 1300 Lincoln St., Denver, Colo.

MAYER, John M., Kingston, N. Y.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

MEDIA Carriage Mfg. Co., Media, Pa.

MIFFLINBURG Body & Gear Co., Mifflinburg, Pa.

MONROE Body Co., Osmun St., Pontiac, Mich.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

NEW Haven Carriage Co., New Haven, Conn.
(See page 73.)

PAGE, Samuel K., 60 Franklin St., New Haven, Conn.

RECH-MARBAKER Co., Eighth St. & Girard Ave., Philadelphia, Pa.

RICKARDS & McLaughlin Wagon Co., Trenton, N. J.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind.
(See page 75.)

ROGERS Co., Wm. D., 1926 Arch St., Philadelphia, Pa.

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHOELER Bros., 247 Milwaukee Ave., Milwaukee, Wis.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SHIELDS Carriage Co., 11 Carriage Ave., Amesbury, Mass.

SIEVERS & Erdman, 294-98 Jefferson Ave., Detroit, Mich.

SMITH Carriage Co., R. J., Lake & Lyell Sts., Rochester, N. Y.

STONE & Sons, C., 1658-74 Ogden Ave., Chicago, Ill.

SWAN Demountable Body Co., 4021 Payne Ave., Cleveland, O.

TERRILL Bros., Hamilton & Church Sts., Rahway, N. J.

TIERNEY, P. J., Boston Post Rd., New Rochelle, N. Y.

TROY Mfg. Co., Troy, O.

UNION City Body Co., Union City, Ind.

VALENTINE, J. S., 432-38 Princeton Ave., Trenton, N. J.

VON DOMARUS, Geo., 847 Larrabee St., Chicago, Ill.

WALKER Carriage Co., Merrimac, Mass.
(See page 73.)

WALKER & Co., Alfred J., 223 W. 66th St., New York, N. Y.

WAVERLEY Co., 139 S. East St., Indianapolis, Ind.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WILLOUGHBY Co., Dwyer Ave. & Turner St., Utica, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

YORK Wagon Gear Co., York, Pa.

YOUSE Co., E. S., 46 N. Fifth St., Reading, Pa.

ZIMMERMAN & Sons, F. F., Main St., Waupun, Wis.

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LALLY Commercial Body Co., Paris St., Everett, Mass.

LITTLEFORD Bros., 453-57 E. Pearl St., Cincinnati, O.

LYNCH Mfg. Co., Hammond, Ind.

MONAHAN Vehicle Co., Kinsley Ave. & Eagle St., Providence, R. I.

MOTOR Truck Body Co., 320 Franklin St., Detroit, Mich.

SHADBOLT Mfg. Co., Flushing Ave. & Cumberland St., Brooklyn, N. Y.

WRIGHT Co., Thomas, 71-78 Golden St., Jersey City, N. J.

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OFELDT & Sons, F. W., Nyack, N. Y.

STEAM Carriage Boiler Co., 130 W. First St., Oswego, N. Y.

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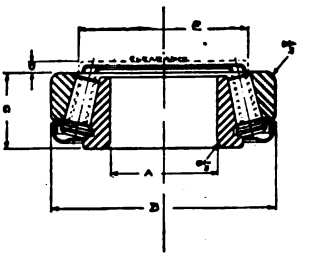

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(See Screws, Cap and Set)

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(See Bolts, Machine and Carriage)

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ANCHOR Bolt & Nut Co., Poughkeepsie, N. Y.

CLARK Bros. Bolt Co., Millidale, Conn. (See page 79.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

DETROIT Screw Works, Detroit, Mich. (See page 341.)

FALLS Rivet Co., Kent, O.

GRAHAM Nut Co., Pittsburg, Pa.

HASKELL Mfg. Co., Wm. H., 24 Commerce St., Pawtucket, R. I.

HAYDON, A. & M., 304 N. 22d St., Philadelphia, Pa.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

KIRK-LATTY Mfg. Co., Madison Ave., Cleveland, O.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

LANZ & Sons, Mathew, 2907 Carson St., Pittsburg, Pa.

NEW Castle Steel & Iron Co., New Castle, Pa.

OLIVER Iron & Steel Co., Pittsburg, Pa.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PITTSBURG Screw & Bolt Co., Preble Ave. (N. S.), Pittsburg, Pa.

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

RHODE Island Tool Co., Providence, R. I.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SHELTON Co., Shelton, Conn.

SKELLY Bolt Co., Thomas P., 24th & Callowhill Sts., Philadelphia, Pa.

SPRING AND SHACKLE BOLTS

BLASER—See H. & M. Screw Co.

BOWEN Mfg. Co., Auburn, N. Y. (See page 149.)

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

CORCORAN-SEIDEL Co., Cleveland, O.

ELECTRIC Welding Products Co., Cleveland, O. (See page 592.)

H. & M. Screw Co., Fostoria, O. "Blaser."

WINKLEY Co., Detroit, Mich. (See page 79.)

ZERK Mfg. Co., Cleveland, O.

STOVE AND TIRE BOLTS

AMERICAN Screw Co., Providence, R. I.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

CLARK Bros. Bolt Co., Millidale, Conn. (See page 79.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

FALLS Rivet Co., Kent, O.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KIRK-LATTY Mfg. Co., Madison Ave., Cleveland, O.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

TIRE BOLTS

(See Bolts, Stove and Tire)

BONNETS

MOTOR BONNETS

(See Hoods, Motor)

UNDER BONNETS

(See Pans, Dust)

BOOTS

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DEMMERLE & Co., 248 W. 23d St., New York N. Y.

FIRFELT—See Worcester Slipper Co.

GREEN Felt Shoe Co., Daniel, 110 E. 13th St., New York, N. Y.

PUTNAM & Co., A. H., 154 Maple St., Danvers, Mass.

WEINBERGER & Co., A., 112 South St., New York, N. Y.

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ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

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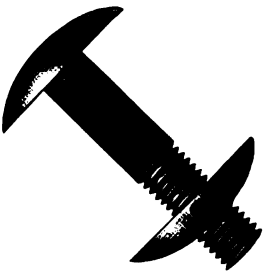

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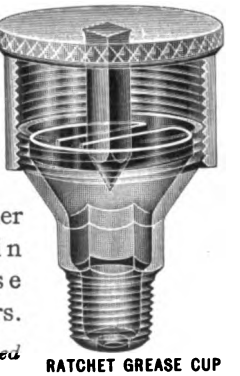

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BAUER-LEWIS Co., 363 Holden Ave., Detroit, Mich.

CAMPBELL—See Perkins-Campbell Co.

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich. (See page 69.)

ECONOMY Stay Co., Jefferson City, Mo.

GILBERT Mfg. Co., New Haven, Conn.

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HOOVER Co., W. H., New Berlin, O.

LEATHER Products Co., 2268 Spring Grove Ave., Cincinnati, O.

NATHAN Novelty Mfg. Co., 90 G. Reade St., New York, N. Y. (See page 347.)

NEMO Chemical & Specialty Mfg. Co, 201 Thompson Bldg., Chicago, Ill. "Niehoff." (See page 131.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

NIEHOFF—See Nemo Chemical & Mfg. Co.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell." (See page 48.)

REINHOLD Belting & Supply Co., 499 Atlantic Ave., Brooklyn, N. Y.

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

SUTHERLAND Co., F. L., 189 Beaubien St., Detroit, Mich. (See page 485.)

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

BOWS

TOP BOWS

AUTO City Bow Co., 441-47 Livernois Ave., Detroit, Mich. (See page 521.)

BROWN & Co., S. N., 111 Commercial St., Dayton, O.

CAMPBELL & Dann Mfg. Co., Tullahoma, Tenn.

CONESTOGA Bending Works, 545 N. Market St., Lancaster, Pa.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DELPHOS Bending Co., Delphos, O.

DETROIT Wood Pulley Co., 1331-37 Bellevue Ave., Detroit, Mich.

EMPIRE Bending Works, 110 S. Christian St., Lancaster, Pa.

LEBZETTER & Son Co., Philip, 241 N. Queen St., Lancaster, Pa.

MILLIKEN, Geo. W., Muncie, Ind.

MOSSMAN, Yarnelle & Co., Pearl St. & Maiden Lane, Fort Wayne, Ind.

SCHERER & Co., H., Detroit, Mich.

SHEPARD & Sons, H. G., James & River Sts., New Haven, Conn.

STARR, D. H., Highland, N. Y.

TOLEDO Bending Co., Toledo, O.

UNION Bow Co., 725-35 Superior Ave., N. W., Cleveland, O.

WAYNE Spoke & Bending Works, Fort Wayne, Ind.

WHEEL & Wood Bending Co., 141 John St., Bridgeport, Conn.

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DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 81.)

HAYES Mfg. Co., Detroit, Mich.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O. "Kinwood."

KINWOOD—See Kinsey Mfg. Co.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE Pressed Steel Co., East Moline, Ill.

NATIONAL Can Co., Detroit, Mich.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SLY Mfg. Co., W. W., Cleveland, O.

STANDARD Steel Box Co., Bridgeville, Pa.

VICTOR Auto Parts Co., Second & Elm Sts., Cincinnati, O.

WOOD BATTERY BOXES

(See also Holders, Battery)

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

BLAKELEY, W. W., 100 Leicester Ct., Detroit, Mich.

BLISS Mfg. Co., R., Pawtucket, R. I.

CHURCHILL Cabinet Co., 2119 Churchill St., Chicago, Ill.

KARREMAN Co., Grand Rapids, Mich.

STANDARD Cabinet Mfg. Co., Peru, Ind.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

SPARK COIL BOXES

AUTO Body Co., Lansing, Mich. (See page 73.)

BLISS Mfg. Co., R., Pawtucket, R. I.

BUBECK & Guerin, 161-63 W. 18th St., New York, N. Y.

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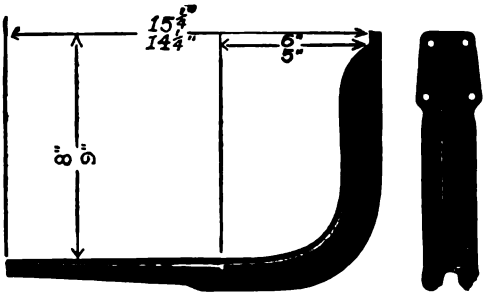

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DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 81.)

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HAYES Mfg. Co., Detroit, Mich.

KINSEY Mfg. Co., Toledo, O. "Kinwood."

KINWOOD—See Kinsey Mfg. Co.

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MOLINE Pressed Steel Co., East Moline, Ill.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

STANDARD Steel Box Co., Bridgeville, Pa.

UNITED States Metal Products Co., 111 Broadway, New York, N. Y. (See page 83.)

VICTOR Auto Parts Co., Second & Elm Sts., Cincinnati, O.

WOOD TOOL BOXES

(For Tool Bags—See Bags, Tool)

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

MARON Co., Frank A., Bush Terminal, Brooklyn, N. Y.

STANDARD Cabinet Mfg. Co., Peru, Ind.

TOLLNER'S Sons Co., Chas., Pulaski, N. Y.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

BRACKETS

AUTOMATIC HEADLIGHT BRACKETS

AUTO Protector Co., 58 Tyler St., Springfield, Mass. "Clear-Ahead." (See page 83.)

AUTOMATIC Lamp Control Co., 418 E. First St., Dayton, O. "Dayton."

CLEAR-AHEAD—See Auto Protector Co.

DAYTON—See Automatic Lamp Control Co.

FOX Auto Searchlight Co., 78 Fountain St., Providence, R. I.

HEADLIGHT Support Co., 728 Woodward Ave., Detroit, Mich.

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RADIALITE—See Winona Carriage Co.

RHOADS Automobile Headlight Adjuster Co., 1720 Central Ave., Kansas City, Kans.

SEEATURN—See Poughkeepsie Utilities Corp.

SEEITALL Mfg. Co., 813 Mulberry St., Des Moines, Ia.

WINONA Carriage Co., Winona, Minn. "Radialite."

ZIMMERMAN Headlight Co., 917 E. Broadway, Louisville, Ky.

HEADLIGHT BRACKETS

CLEVELAND Hardware Co., Cleveland, O.

GARAGE Equipment Mfg Co., Milwaukee, Wis. (See page 87.)

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J.

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(For attaching Horn Button to Steering Column)

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GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. (See page 329.)

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill.

SMITH & Co., Jos. N., Detroit, Mich. (See page 203.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 327.)

BRAKES

ELECTRIC BRAKES

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J. (See page 353.)

EXPANDING AND CONTRACTING BRAKES

DUPLEX—See Royal Equipment Co.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 81.)

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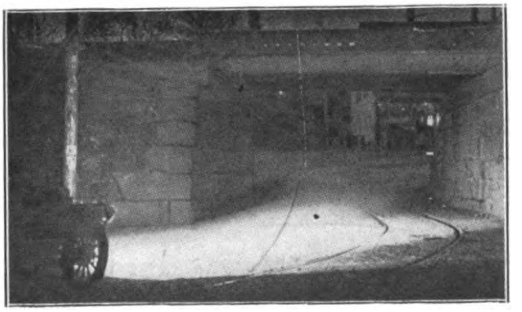

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BRAKES (Continued)

EXPANDING AND CONTRACTING BRAKES (Continued)

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(See page 135.)

RAYMOND—See Royal Equipment Co.

ROYAL Equipment Co., 1372 Bostwick Ave., Bridgeport, Conn. "Raymond," "Duplex."
(See page 85.)

DROP OR SPRAG BRAKES

PERFECT—See Youse Co.

YOUSE Co., E. S., 46 N. Fifth St., Reading, Pa. "Perfect."

BRASS

SHEET AND ROD BRASS AND COPPER

(For Tubing—See Tubing, Brass. For Castings—See Castings, Aluminum)

AMERICAN Brass Co. (Ansonia Brass & Copper Branch), Ansonia, Conn.

AMERICAN Brass Co. (Coe Brass Branch), Torrington, Conn.

AMERICAN Brass Co. (Benedict & Burnham Branch), Waterbury, Conn.

AMERICAN Brass Co. (Waterbury Brass Branch), 26 Crane St., Waterbury, Conn.

AMERICAN Brass Co. (Kenosha Branch), Kenosha, Wis.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn.
(See page 319.)

BUFFALO Copper & Brass Rolling Mill, Military Rd. & Hertel Ave., Buffalo, N. Y.

CHASE Rolling Mill Co., Waterbury, Conn.

DETROIT Copper & Brass Rolling Mills, Clark Ave. & Wabash R. R., Detroit, Mich.

MANHATTAN Brass Co., 328 E. 28th St., New York, N. Y.

MICHIGAN Copper & Brass Co., 1611 Jefferson Ave., W., Detroit, Mich. "Wolverine."

NEW HAVEN Copper Co., Seymour, Conn.

NEW JERSEY Tube Co., Newark, N. J.

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

RANDOLPH-CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

SCOVILL Mfg. Co., 99 Mill St., Waterbury, Conn.

SEYMOUR Mfg. Co., Seymour, Conn.

STAMFORD German Silver Co., Stamford, Conn.

TAUNTON-NEW BEDFORD Copper Co., Taunton, Mass.

WOLVERINE—See Michigan Copper & Brass Co.

BRAZIERS

CAST IRON BRAZIERS

CAST Iron Brazing & Mfg. Co., Manchester, N. H.

NEW York Brazing Co., 196 11th Ave., New York, N. Y.

PITTSBURGH Reinforced Brazing & Machine Co., 2525 Liberty Ave., Pittsburg, Pa.

VULCAN Brazing & Machine Co., 310-12 N. 16th St., Philadelphia, Pa.
(See page 507.)

WILKES-BARRE Welding Co., 6 W. Ross St., Wilkes-Barre, Pa

BROADCLOTH

UPHOLSTERY BROADCLOTH

(See also Trimmings, Cloth and Carpet)

AMERICAN Mills Co., 17th St. & Fourth Ave., New York, N. Y.

ROY Woolen Co., Watervliet, N. Y.

SLATER & Sons, Webster, Mass.

WATERLOO Woolen Mfg. Co., Waterloo, N. Y.

BRUSHES

CARBON MOTOR BRUSHES

AMERICAN Carbon & Battery Co., Signal Hill, Ill.

JEANDRON, W. J., 172 Fulton St., New York, N. Y. (Importer.) "Le Carbone."

LE CARBONE—See Jeandron, W. J.

NATIONAL Carbon Co., Cleveland, O.

NUNGESSER Carbon & Battery Co., 1170 E. 38th St., Cleveland, O.

SPEER Carbon Co., St. Marys, Pa.

STACKPOLE Carbon Co., St. Marys, Pa.
(See page 481.)

SPARK PLUG BRUSHES

AMERICAN Wire Brush Co., 202-04 Centre St., New York, N. Y.

OSBORN Mfg. Co., 5401 Hamilton Ave., N. E., Cleveland, O.

BUCKETS

COLLAPSIBLE BUCKETS

CHANNON Co., H., 150 N. Market St., Chicago, Ill.

DUPLEX—See Planet Co.

FAULTLESS—See National Mfg. Co.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

NATIONAL Mfg. Co., 17th & Locust Sts., Des Moines, Ia. "Faultless."

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THIS name stands for the finest brake lining possible to make. It represents a high degree of quality and wearing power which no competitive product has ever been able to attain. We could cheapen

TRADE MARK
Raybestos
REG. U.S. PAT. OFF.

in many ways and sell it at a lower price. But that we will never do. The integrity of the Raybestos name and the safety of the Raybestos user far outweigh all other considerations.

Whenever you see the name Raybestos you will know it represents the very utmost in safety, serviceability and strength.

In these days of frenzied competition in the brake lining field we believe this declaration of principles is needed. And we back it up with a definite one year guarantee that no other maker duplicates.

Insist on getting Raybestos. You can always recognize it by the silver edges and the name stamped on every foot.

THE ROYAL EQUIPMENT CO.

1372 Bostwick Avenue, Bridgeport, Conn.

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BUCKETS (Continued)

COLLAPSIBLE BUCKETS (Continued)

PILLSBURY Mfg. Co., 1206 Hennepin Ave., Minneapolis, Minn. "Wauto."

PLANET Co., Westfield, Mass. "Duplex."

WAUTO—See Pillsbury Mfg. Co.

WHITALL-TATUM Co., 42 Barclay St., New York, N. Y.

BUCKLES

STRAP BUCKLES

ANCHOR—See North & Judd Mfg. Co.

COWLES & Co., C., New Haven, Conn. (See page 463.)

CRANDAL, Stone & Co., Binghamton, N. Y. (See page 365.)

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

FRAZER & Jones Co., Syracuse, N. Y.

LYNCH Mfg. Co., Madison, Wis. (Lock.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NORTH & Judd Mfg. Co., New Britain, Conn. "Anchor."

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 163.)

WARNER Bros. Co., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

TURN-BUCKLES

(See Turn-Buckles, Wrought)

BULBS

RUBBER HORN BULBS

CANFIELD Co., H. O., Bridgeport, Conn.

DAVOL Rubber Co., Providence, R. I.

GOODRICH Co., B. F., Akron, O.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

PARKER, Stearns & Co., 286 Sheffield Ave., Brooklyn, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn.

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

BUMPERS

AUTOMOBILE BUMPERS

(For protecting Lamps and Radiators)

AETNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

AUTO Cushion Fender Co., Clinton Bldg., Columbus, O.

AUTO Parts Mfg. Co., Jackson & Michigan Sts., Milwaukee, Wis. "Badger."

BADGER—See Auto Parts Mfg. Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill.

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye," "Champion."

CHAMPION—See Central Brass & Fixture Co.

CHICAGO—See Western Brass Mfg. Works.

COMMON SENSE—See Hoover Spring Co.

COMMON SENSE—See Pratt Mfg. Co.

CONOVER—See New Jersey Tube Co.

COX Brass Mfg. Co., Albany, N. Y. (See page 511.)

DIAMOND—See Sager Co.

ESSEX—See S.B.R. Specialty Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Hercules," "Universal," "Gemco," "Simplex." (See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y.

HALLADAY Co., L. P., Streator, Ill. "Imperial," "Universal."

HARROUN—See Turner Brass Works.

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J. (See page 353.)

HERCULES—See Garage Equipment Mfg. Co.

HERCULES—See Milwaukee Auto Engine & Supply Co.

HOOVER Spring Co., 617-37 Turk St., San Francisco, Cal. "Common Sense."

IMPERIAL—See Halladay Co.

KIMBALL & Co., C. P., Chicago, Ill. (See page 87.)

McGREGOR—See U. S. Auto Bumper Co.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis. "Hercules."

NATIONAL Automatic Vehicle Fender Co., 1446 N. 16th St., Omaha, Neb.

NEW JERSEY Tube Co., Newark, N. J. "Conover."

PERFECT—See Pratt Mfg. Co.

POLSON Mfg. Co., 27 Chenango St., Buffalo, N. Y.

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill. "Common Sense," "Perfect."

S.B.R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Essex."

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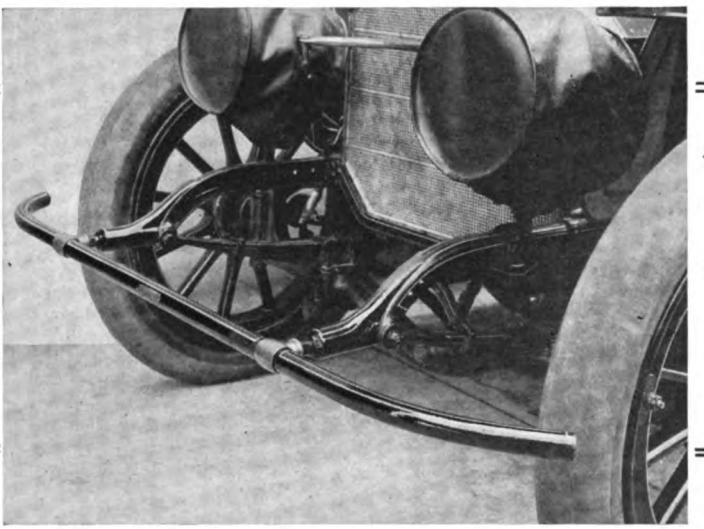
KIMBALL PROTECTION BUMPER

Strongest and best Spring Bumper on the market. The only accessory of this nature that actually improves the appearance of the car

Absorbs the Shock

Protects Radiators and Lamps



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Bumpers
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Rear End Tire Holders
Lamp Brackets
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Stampings of All Kinds
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Mud Hooks
Tire Locks
Turn Buckles & Valve Tools
Fore Door Ventilators

GARAGE EQUIPMENT MFG. CO., MILWAUKEE, WIS.

Largest General Manufacturers of Accessories in the World.

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BUMPERS (Continued)

AUTOMOBILE BUMPERS (Continued)

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "Diamond," "Simplex."

SIMPLEX—See Garage Equipment Co.

SIMPLEX—See Sager Co.

SMITH, H. Lund, 199-203 Paterson St., Paterson, N. J.

STANDARD Brass & Iron Works, 1820 St. Paul Ave., Milwaukee, Wis.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STEVENS Mfg. & Supply Co., Fischer Bldg., Chicago, Ill.

TURNER Brass Works, Sycamore, Ill. "Harroun."

U. S. Auto Bumper Co., 20 E. 20th St., Chicago, Ill. "McGregor."

UNIVERSAL—See Garage Equipment Mfg. Co.

UNIVERSAL—See Halladay Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. "Chicago."
(See page 327.)

RUBBER SPRING BUMPERS

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O.

BOSTON Belting Co., 84 Linden Park St., Boston, Mass.

BRIDGE Web Tire Co., 2962 Prairie Ave., Chicago, Ill.

CANFIELD Co., H. O., Bridgeport, Conn.

CANFIELD Rubber Co., Bridgeport, Conn.

CENTURY—See Nemo Chemical & Specialty Mfg. Co.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 139.)

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Works, Erie, Pa.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

MATTSON Rubber Co., Lodi, N. J.
(See page 471.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill. "Century."
(See page 131.)

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick St., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn.

THERMOID Rubber Co., Trenton, N. J.
(See page 55.)

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.
(See page 355.)

BURNERS

ACETYLENE LAMP BURNERS

ALCO—See American Lava Co.

AMBO—See American Lava Co.

AMERICAN Lava Co., Chattanooga, Tenn. "Hela," "Alco," "De Luxe," "No-Name," "Ambo," "Hilo," "Duro," "Hexo."

AURORA—See Steward Mfg. Co.

BRAY ELTA—See Crane Co.

BRAY LUTA—See Crane Co.

BRAY RONI—See Crane Co.

CARROLL, J. B., 3057 Carroll Ave., Chicago, Ill. "Hahn."

CRANE Co., Wm. M., 16-20 W. 32d St., New York, N. Y. (Importers.) "Bray Roni," "Bray Elta," "Bray Luta."
(See page 501.)

CRESCENT—See Kirchberger & Co.

DE LUXE—See American Lava Co.

DRAKE Acetylene Burner Co., San Jose, Cal.

DURO—See American Lava Co.

HAHN—See Carroll, J. B.

HELA—See American Lava Co.

HEXO—See American Lava Co.

HILO—See American Lava Co.

KIRCHBERGER & Co., M., 374-80 Second Ave., New York, N. Y. "Crescent," "Von Schwartz," "Perfection," "Koro," "Matador," "Victory.'

KORO—See Kirchberger & Co.

LENHART Mfg. Co., 246 N. Delaware Ave., Philadelphia, Pa. "Tri-Radiant."

MATADOR—See Kirchberger & Co.

NO-NAME—See American Lava Co.

NOVELTY Burner Co., Chattanooga, Tenn. "Queen Eta."

PERFECTION—See Kirchberger & Co.

QUEEN ETA—See Novelty Burner Co.

STANDARD Acetylene Burner Co., Tasso, Tenn.

STARR—See Steward Mfg. Co.

STEWARD Mfg. Co., D. M., Chattanooga, Tenn. "Wonder," "Starr," "Aurora."

TENNESSEE Burner Mfg. Co., Chattanooga, Tenn. "X. L."

TRI-RADIANT—See Lenhart Mfg. Co.

VICTORY—See Kirchberger & Co.

VON SCHWARZ—See Kirchberger & Co.

WONDER—See Steward Mfg. Co.

X. L.—See Tennessee Burner Mfg. Co.

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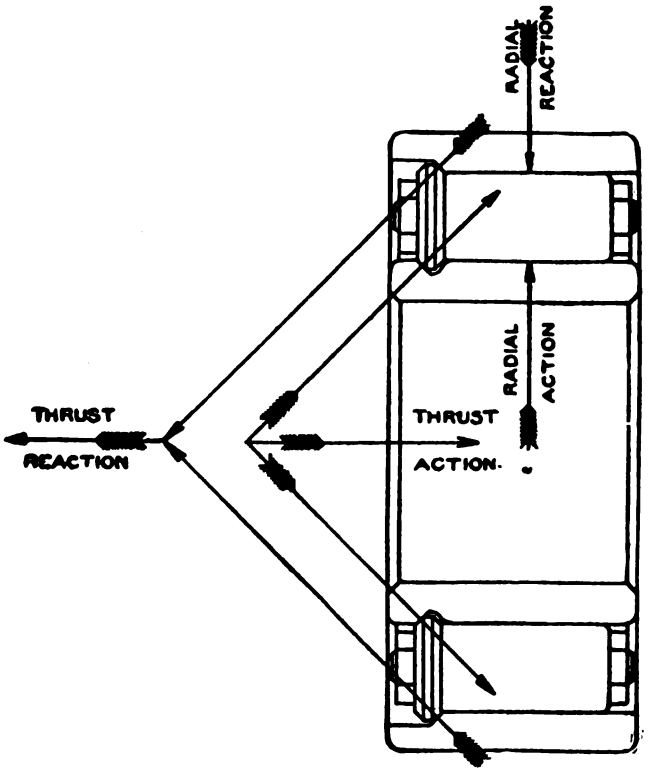
"BOWER SAVES POWER"



Specialized Functions

Any bearing is subject to stresses of four kinds:

1. Radial action
2. Radial reaction
3. Thrust action
4. Thrust reaction

Bower Roller Bearings are so constructed that each of these stresses is carried by a surface accurately designed and proportioned to bear that stress most efficiently.

This is but one of the numerous features of Bower Roller Bearings.

BOWER ROLLER BEARING CO.

DETROIT, MICHIGAN

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BURNERS (Continued)

SPECIAL ACETYLENE LAMP BURNERS

(Automatic and Electric Lighting Burners; see also Lighters, Acetylene Lamp)

ADVANCE Motor Specialties Co., 508 S. Dearborn St., Chicago, Ill. "Matchless."

ALCO CHICAGO—See American Lava Co.

AMERICAN Lava Co., Chattanooga, Tenn. "Alco Chicago."

INST Lighter Co., 59 E. Main St., Columbus, O.

MATCHLESS—See Advance Motor Specialties Co.

MORGAN Mfg. Co., John St., Newport, R. I.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind. (See page 509.)

GASOLINE AND KEROSENE BURNERS

(For Steam Boilers)

FORG, Peter, 50 Park St., Somerville, Mass.

OFELDT & Sons, August, Valley Stream, N. Y.

OFELDT & Sons, F. W., Nyack, N. Y.

SIMMONS, H. C., North Burlington, Vt.

BUSHINGS

STARTER OR PRIMER ATTACHING BUSHINGS

(For use on motors not equipped with pet cocks)

STRYKER, C. W., 240 Shonnard St., Syracuse, N. Y.

BUTTONS

UPHOLSTERY BUTTONS

ATLAS Tack Co., Fairhaven, Mass.

COWLES & Co., C., New Haven, Conn. (See page 463.)

CRANDAL, Stone & Co., Binghamton, N. Y. (See page 365.)

HIGGIN Mfg. Co., Newport, Ky.

LANDERS Bros. Co., Dept. A., Toledo, O. (See page 443.)

LOUNSBERY & Sons, G. H., 107-09 W. Third St., Cincinnati, O.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MILONITE—See Morley Mfg. Co.

MORLEY Mfg. Co., 120 Boylston St., Boston, Mass. "Milonite."

NEIDER Co., F. A., Augusta, Ky.

NEW Haven Button Co., 161 Brewery St., New Haven, Conn.

READE, Chas. W., 346 Sherman Ave., New Haven, Conn.

TOCKWOTTON Co., 79 S. Main St., Providence, R. I.

TUFTING Machine Supply Co., Detroit, Mich.

UNITED Button Co., Union St., Easthampton, Mass.

WHITE Co., L. C., 214 Bank St., Waterbury, Conn.

CABLE

IGNITION CABLE

(See Wire, Insulated)

WIRE CABLE

(See Rope, Bronze Wire; also Rope, Steel Wire)

CABLES

TOP CABLES

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

CAM-SHAFTS

FINISHED OR MACHINED CAM-SHAFTS

COMMERCIAL Machine Co., 48 E. Front St., Dunkirk, N. Y.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 527.)

JACKSON Motor Shaft Co., Jackson, Mich. (See page 93.)

MUSKEGON Motor Specialties Co., Muskegon, Mich. (See page 91.)

PENINSULAR Auto Parts Co., Lafayette Ave., E., Detroit, Mich.

CANOPIES

AUTOMOBILE CANOPIES

(See Tops, Automobile)

CANS

OILING CANS

(For Oil Guns—See Guns, Oil)

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

BLOOMER, R. E., Keithsburg, Ill. "Cannon."

CANNON—See Bloomer, R. E.

CONSOLIDATED Fruit Jar Co., New Brunswick, N. J.

DELPHOS Mfg. Co., 100-24 S. Pierce St., Delphos, O.

Complete Index to Classification appears on Pages 8 to 26.

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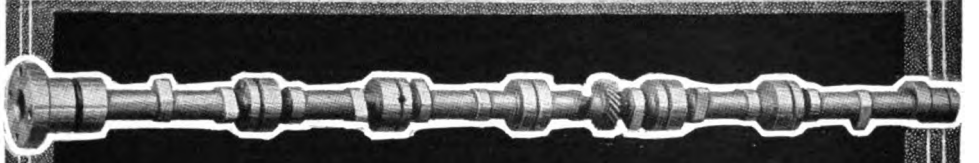

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AND
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MUSKEGON • • • • • MICHIGAN

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CANS (Continued)

OILING CANS (Continued)

DOVER Stamping & Mfg. Co., Cambridge, Mass.
(See page 97.)

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

HERO Mfg. Co., Gaul & Adams Sts., Philadelphia, Pa.

HOWLAND—See Maple City Mfg. Co.

McCLINTOCK & Irvine Co., Neville St. & P. R. R., Pittsburg, Pa.

MAPLE City Mfg. Co., Monmouth, Ill. "Howland."

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

NOERA Mfg. Co., Waterbury, Conn.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VOGEL & Bros., Wm., Brooklyn, N. Y.

WALL Mfg. Supply Co., P., 720 Preble Ave., Pittsburg, Pa.

WILL Mfg. Co., 1742 Monadnock Blk., Chicago, Ill.

CAPS

HUB CAPS

(Pressed or Stamped Caps. For Cast Caps—See Castings)

ACKLIN Stamping Co., Toledo, O.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 217.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CROSBY Co., Buffalo, N. Y.
(See page 539.)

GIER & Dail Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn.
(See page 297.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KONIGSLOW Mfg. Co., Otto., E. 35th St. & Perkins Ave., Cleveland, O.

LINDHOLM Metal Stamping Co., 107-15 Erie St., Camden, N. J.
(See page 149.)

OAKES Pressed Steel Co., Indianapolis, Ind.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

MOTORISTS CAPS

ADIRONDACK—See Spear-Martin Fur Co.

AMERICAN-BUFFALO Robe Co., 1-7 Howell St., Buffalo, N. Y.

BISHOP Co., J. H., Wyandotte, Mich.

BRADLEY Knitting Co., Delevan, Wis.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

DINNER Co., Isaac H., 694 Washington St., Boston, Mass.

FAVORITE Knitting Mills, 1388 W. Sixth St., Cleveland, O.

FORMAN & Co., E., 578 Washington St., Boston, Mass.

FREEMAN-HIRSCHSTICK Co., 227 W. Madison St., Chicago, Ill.

GILBERT Mfg. Co., New Haven, Conn.

HENDRICKSON Hat Co., A. P., 127-29 S. Meridian St., Indianapolis, Ind.

KAPLAN, Frank & Dunn, 113-15 University Pl., New York, N. Y.

LASKY & Levy, 756-60 Broadway, New York, N. Y.

MARSHALL, P. V. & E. L., 49 W. Larned St., Detroit, Mich. "Shapkes."

MORAWETZ Co., 217-25 E. Water St., Milwaukee, Wis.

PONTIAC Knitting Co., Pontiac, Mich.

REVILLON Freres, 19 W. 34th St., New York, N. Y.

SHAPKES—See Marshall, P. V. & E. L.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

SPEAR & CO., Woodhaven, N. Y.

BRASS RADIATOR CAPS

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

BUSH MFG. Co., Hartford, Conn.
(See page 363.)

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

TAKE-APART-RADIATOR Co., 804 E. Washington St., Greensburg, Ind.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

RUBBER RADIATOR CAPS

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

CONDENSITE Co. of America, Belleville Ave., Glen Ridge, N. J.

GENERAL Insulate Co., 1008-14 Atlantic Ave., Brooklyn, N. Y.

LUZERNE Rubber Co., Trenton, N. J.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

STOKES Rubber Co., Jos., Trenton, N. J.

CARBIDE

CALCIUM CARBIDE

AMERICAN Carbolite Sales Co., 301 S. 55th Ave., W., Duluth, Minn. "Carbolite."

CARBOLITE—See American Carbolite Sales Co.

UNION Carbide Sales Co., 122 S. Michigan Blvd., Chicago, Ill.

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Our new fireproof plant, which is equipped with the latest and best machinery, and with our

Special Testing Machines

of our own design, makes it possible for our organization, composed of expert mechanics, to produce more accurate work.

Estimates Furnished

on forgings finished complete, or finishing only.

THE JACKSON MOTOR SHAFT COMPANY

JACKSON MICHIGAN

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CARBURETERS

GASOLINE CARBURETERS

(For Mixing Valves or Vaporizers—See Vaporizers

AIR-FRICTION Carburetor Co., Dayton, O.

ATKINS Carbureter Co., Dwight, Ill.

B-D—See Detroit Motor Casting Co.

BALL SPRAY—See Shain, Chas. D.

BENNETT — See Wilcox - Bennett Carbureter Co.

BINGHAM Mfg. Co., 227 Prospect Ave., N. W., Cleveland, O. "Climax."

BOWERS—See Gilbert Mfg. Co.

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

BYRNE, Kingston & Co., 1040 Webster St., Kokomo, Ind. "Kingston."

C. R. G. Mfg. Co., Saugus, Mass.

CARTER Carburetor Co., 912 N. Market St., St. Louis, Mo.

CLEVELAND Carbureter Co., 1232 Addison Rd., Cleveland, O.

CLIMAX—See Bingham Mfg. Co.

CRAWFORD Carburetor Co., 62 Bagg St., Detroit, Mich.

CURTIS-PEMBROKE Co., 324 East Ave., Rochester, N. Y.

D. K. W.—See Duquesne Auto Accessory Co.

DALEY, Walter A., 3520 Melrose St., Chicago, Ill.

DETROIT Carbureter Co., Detroit, Mich. "E. C. B."

DETROIT Lubricator Co., Detroit, Mich. "Stewart." (See page 245.)

DETROIT Motor Casting Co., 299-303 Beaufait Ave., Detroit, Mich. "B-D."

DUQUESNE Auto Accessory Co., New Kensington, Pa. "D. K. W."

E. C. B.—See Detroit Carbureter Co.

EXCELSIOR Needle Co., Torrington, Conn.

ESS-ESS—See Scott & Sons Co.

FINDEISEN & Kropf Mfg. Co., 2125 Rockwell St., Chicago, Ill. "Rayfield." (See page 95.)

FLECHTER—See Trenton Brass and Machine Co.

FOLBERTH Auto Specialty Co., Lake Ave. & W. 80th St., N. W., Cleveland, O.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill. "Vortex."

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

G. & A. Carburetor Co., 450-52 Sixth Ave., New York, N. Y.

GARDNER Carbureter & Brass Works, Shreveport, La.

GILBERT Mfg. Co., New Haven, Conn. "Bowers."

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y. "Maco."

H & N Sales Co., 38-40 W. 62d St., New York, N. Y.

HEINZE Electric Co., Lowell, Mass. (See page 499.)

HEITGER Carbureter Co., 1127 Beecher St., Indianapolis, Ind.

HOLLEY Bros. Co., Detroit, Mich.

HOLTZER-CABOT Electric Co., Brookline, Mass. "Newcomb."

HOYT Carbureter & Automobile Co., 45 Union Ave., Boston, Mass.

HUGUELET Carbureter Co., 908 Lincoln Park Blvd., Chicago, Ill.

J-B Carburetor Corp., Main & Washington Sts., Los Angeles, Cal.

JOHNSON—See Perkins-Campbell Co.

K. D. Carburetor Co., 5915 Bonna Ave., Cleveland, O.

KENNEDY—See Robbins Co.

KINGSTON—See Byrne, Kingston & Co.

KRICE Carburetor Co., McLean & Oakland Aves., Detroit, Mich.

L-A-W—See Utica Steam Gauge Co.

LONGUEMARE Carburetor Co., 246 W. 59th St., New York, N. Y. (Importers.)

MACO—See Gleason-Peters Air Pump Co.

MALLEABLE Iron Fittings Co., Branford, Conn. (See page 477.)

MARVEL Carburetor Co., Mill St., Flint, Mich.

MASTER Carburetor Corp., 944 Woodward Ave., Detroit, Mich.

MAXI Co., 216 High St., Newark, N. J.

MAYER Carburetor Co., 2673 Main St., Buffalo, N. Y.

MOSLER & Co., A. R., Mt. Vernon, N. Y. (See page 299.)

MOTSINGER Device Mfg. Co., Lafayette, Ind.

MUIR Co., Equitable Bldg., Baltimore, Md.

MYERS Co., Arthur J., 62d St. & Broadway, New York, N. Y.

NATIONAL Auto Accessory Co., Salem Depot, N. H.

NEWCOMB—See Holtzer-Cabot Electric Co.

NORTH Chicago Machine Co., 22d St. & Commonwealth Ave., North Chicago, Ill. "Palmbla."

P R Mfg. Co., 621 Bellevue Ave., Detroit, Mich.

PALMBLA—See North Chicago Machine Co.

PARKER Carburetor Co., Charles River Rd., Cambridge, Mass.

PARKIN & Son, 2417 N. Broad St., Philadelphia, Pa.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Johnson." (See page 48.)

PRICE, John R., 68 Marshall St., Newark, N. J.

QUADRUPLEX—See Walker & Co.

RAYFIELD—See Findeisen & Kropf Mfg. Co.

ROBBINS Co., L. D., 156 Broad St., Lynn, Mass. "Kennedy."

ROBY Carbureter Co., Indianapolis, Ind.

RUSSELL Eureka Carburetter Co., Rudd, Ia.

S. U.—See Simms Magneto Co.

SCHEBLER——See Wheeler & Schebler.

SCOTT & Sons Co., Medford, Mass. "Ess-Ess."

SHAIN, Chas. D., Box 53, Station L., Brooklyn, N. Y. "Ball Spray." (See page 97.)

SIMMS Magneto Co., Bloomfield, N. J. "S. U."

SIRO Carburetor Mfg. Co., Northampton, Mass.

Complete Index to Classification appears on Pages 8 to 26.

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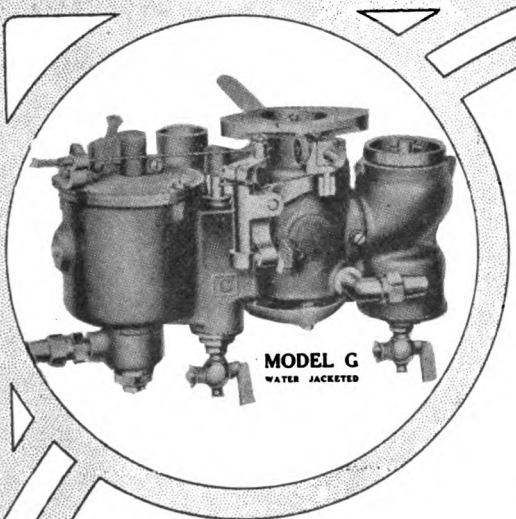
RAYFIELD CARBURETORS



Suppose some one put a MODEL G RAYFIELD on your car without your knowledge—

When next you touched the throttle you would wonder what elixir of life had been breathed into your motor.

You would find in it a new power, a quicker response, a steadier pull and an abundance of energy that would give you a new idea of what your motor could do.

But you would be using from 10% to 50% less gasoline and you could throttle it down to a beat as slow as your pulse.

It doesn't matter what car you are driving either, or what carburetor is on it, or what mileage you have been getting to a gallon of gas; the Rayfield opens up a new kind of motoring.

The Model G has only two simple adjustments and can easily be installed by any good mechanic. Dealers find it profitable to handle because it gives unusual satisfaction. We would be glad to advise you about what you could expect to do with it in your territory. Write us.

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BRANCHES: 1140 Michigan Ave., Chicago 1211 Woodward Ave., Detroit
1902 Broadway, New York

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CARBURETERS (Continued)

GASOLINE CARBURETERS (Continued)

STEWART—See Detroit Lubricator Co.

STEWART Machine Works, Alfred C., Tenth & Santee Sts., Los Angeles, Cal.

STROMBERG Motor Devices Co., 64-68 E. 25th St., Chicago, Ill.

SUNDERMAN Safety Carburetor Corp., 2 West St., Newburgh, N. Y.

TRENTON Brass & Machine Co., Trenton, N. J. "Flechter."

UTICA Steam Gauge Co., Frankfort, N. Y. "L-A-W."

VORTEX—See Fowler Lamp & Mfg. Co.

WALKER & Co., O. S., Rockdale St., Worcester, Mass. "Quadruplex."

WEBBER & Blomquist, 11 Phillips St., Neponset, Mass.

WHEELER & Schebler, Indianapolis, Ind. "Schebler." (See page 97.)

WHITE Bros., Mansfield, O.

WILCOX-BENNETT Carburetter Co., 1030 Marshall St., N. E., Minneapolis, Minn. "Bennett."

ZENITH Carbureter Co., ft. Vanda Ave., Detroit, Mich.

KEROSENE CARBURETERS

BARNARD Mfg. Co., 3300 Maple Ave., Los Angeles, Cal.

BENNETT—See Wilcox-Bennett Carburetter Co.

CAMDEN-ANCHOR Rockland Machine Co., Camden, Me. "Knox."

G. C. Vaporizer Co. of America, 1790 Broadway, New York, N. Y.

HARROUN—See Invincible Mfg. Co.

INVINCIBLE Mfg. Co., Pittsburg, Pa. "Harroun."

K. C. B. Co., 707 Woodward Ave., Detroit, Mich.

KNOX—See Camden-Anchor Rockland Machine Co.

MASTER Carburetor Corp., 944 Woodward Ave., Detroit, Mich.

REID Perfect Appliance Co., 1926 Broadway, New York, N. Y.

RUSSELL Eureka Carburetter Co., Rudd, Ia.

SENRAB Carburetor Co., Sea Cliff, N. Y.

UNIVERSAL Oil Converter Co., 47 West St., New York, N. Y.

WHITE Bros., Mansfield, O.

WILCOX-BENNETT Carburetter Co., 1030 Marshall St., N. E., Minneapolis, Minn. "Bennett."

CARPET

COACH CARPET

(See also Trimmings, Cloth and Carpet)

COCHRANE Mfg. Co., East Dedham, Mass.

DOBSON, John & James, 809 Chestnut St., Philadelphia, Pa.

HIRST-ROGER Co., Allegheny & Kensington Aves., Philadelphia, Pa.

SCHOFIELD, Mason & Co., Fairhill, Reese & Cumberland Sts., Philadelphia, Pa.

CASES

BATTERY CASES

(See Boxes, Battery)

CARD CASES

(See Cases, Toilet)

CURTAIN CASES

(For carrying top curtains when not in use)

AMERICAN Vulcanized Fibre Co., 500 Equitable Bldg., Wilmington, Del. "Vul-Cot." (See page 165.)

VUL-COT—See American Vulcanized Fibre Co.

EXTRA LAMP BULB CASES

(Steel Cases or Boxes for Carrying Spare Lamp Bulbs on Car).

DOVER Stamping & Mfg. Co., Cambridge, Mass. (See page 97.)

J. & B. Mfg. Co., 65 Eagle St., Pittsfield, Mass.

MEDICAL EMERGENCY CASES

ACCIDENT Cabinet Co., Kalamazoo, Mich.

BURROUGHS, Wellcome & Co., 35-39 W. 33d St., New York, N. Y. "Tabloid."

K. W. P. Co., 907 S. Michigan St., South Bend, Ind.

SHARP & Smith, 103 N. Wabash Ave., Chicago, Ill.

TABLOID—See Burroughs, Wellcome & Co.

SPARK COIL CASES

(See Boxes, Spark Coil)

SPARK PLUG CASES

(Leather cases for holding spare plugs)

ALGCO—See Auburn Leather Goods Co.

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

AUBURN Leather Goods Co., Auburn, N. Y. "Algco."

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HOPEWELL Bros., Newton, Mass. (See page 97.)

NATHAN Novelty Mfg. Co., 906 Reade St., New York, N. Y. (See page 347.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

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THE STANDARD
CARBURETOR
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MANUFACTURERS
INDIANAPOLIS, : : U. S. A.

We are pioneers in
Perfect Carburetion

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OTHER, IS

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SEND FOR BOOKLET
CHAS. D. SHAIN, Box 53, Sta. L, Brooklyn, N. Y.

No Float or Needle Valve Required

AUTOMATICALLY SHUTS OFF
WHEN THE ENGINE STOPS

PRICES

1 inch, ...	$ 6.00
1¼ inch, ...	8.00
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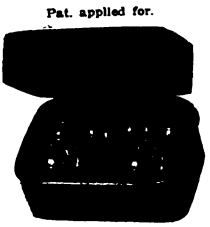

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DOVER AUTO SPECIALTIES

is the

New Dover Electric Light Bulb Case

It will carry extra bulbs safer than the ones in the lamps of the car. Made of extra heavy seamless steel—all other parts Electric Welded. No rivets or solder used in the construction.

The bulbs are securely held in place by a new brass spring locking device, which gives absolute protection against rough handling and vibration.

A new bulb always ready in perfect condition when needed.

Do not confuse our heavy seamless steel case with the cheap pasteboard or wood boxes, which are quickly ruined by moisture or rough handling and are only fit for keeping bulbs on the shelf in a store.

Send for New Catalog of over 235 Dover Auto Specialties.

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Cambridge, Mass.

THIS CASE IS EXCELLED ONLY BY THE HOPEWELL SPIRAL SPRING TIRE CASE. :: :: :: ::

Price in Enamel Duck $2.50
Very liberal discount to trade

HOPEWELL BROTHERS

NEWTON MASS.

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CASES (Continued)

TIRE AND TUBE CASES

(For covering spare tires and tubes)

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y.
(See page 207.)

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill. "Howard," "Chicago."

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOHNET & Co., John, Grand Ave. & Washtenaw St., Lansing, Mich.

CHICAGO—See Atlas Specialty Mfg. Co.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

DAFOE-EUSTICE Co., Jefferson Ave. & Antoine St., Detroit, Mich. "Duk-Bak."

DIAMOND—See Gilbert Mfg. Co.

DUK-BAK—See Defoe-Eustice Co.

FALLS City Buggy Top Co., 128-30 S. Floyd St., Louisville, Ky.

FITZWELL—See Niagara Fabric Mfg. Co.

FULLER Co., G. W., 182-84 Asylum St., Hartford, Conn.

GILBERT Mfg. Co., New Haven, Conn. "Diamond."

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HOPEWELL Bros., Newton, Mass. "Russell."
(See page 97.)

KEYSTONE—See Nathan Novelty Mfg. Co.

HOWARD—See Atlas Specialty Mfg. Co.

IMPERIAL—See Winship, W. W.

LANDERS Bros. Co., Dept. A., Toledo, O.
(See page 443.)

MERCHANT & Evans Co., Philadelphia, Pr. "Star."

NATHAN Novelty Mfg. Co., 906 Reade St., New York, N. Y. "Keystone," "Presto."
(See page 347.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y. "Fitzwell."

OHIO Top Co., 909-11 Broadway, Cincinnati, O.

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

PRESTO—See Nathan Novelty Mfg. Co.

RUSSELL—See Hopewell Bros.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STAR—See Merchant & Evans Co.

TAYLOR Trunk Works, C. A., 39 E. Randolph St., Chicago, Ill.

WILEY & Son Co., Wm. H., 30 Pliny St., Hartford Conn.

WINSHIP, W. W., 71 Summer St., Boston, Mass. "Imperial."

TOILET AND CARD CASES

BRIDGEPORT Coach Lace Co., 1731-37 Broadway, New York, N. Y.
(See page 351.)

COWLES & Co., C., New Haven, Conn.
(See page 463.)

KRAFT & Sons, Theo., 458 W. Broadway, New York, N. Y.

LAW Engineering & Specialty Mfg. Co., Rochester, N. Y.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

PARRY & Co., A. N., Amesbury, Mass.

PERPENTE Mfg. Co., State & Wall Sts., New Haven, Conn.

RUMPP & Sons, C. F., Fifth & Cherry Sts., Philadelphia, Pa.

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

TOOL CASES

(See Bags, Tool; also Boxes, Tool)

CASTINGS

ALUMINUM CASTINGS

A. B. C. Castings Co., 6515 Carnegie Ave., S. E., Cleveland, O.

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 209.)

ADLAKE—See Adams & Westlake Co.

ALLYNE—See Aluminum Castings Co.

ALUMINUM Castings Co., 6217 Carnegie Ave., Cleveland, O. "Lynite."
(See page 99.)

AMERICAN Air Compressor Co., 1528-31 W. Fort St., Detroit, Mich.

AMERICAN Brass & Iron Co., Detroit, Mich.
(See page 83.)

AMERICAN Bronze Co., 90-108 Arthur St., Buffalo, N. Y.

AMERICAN Castings Co., Byrket St. & L. S. & M. S. Ry., Mishawaka, Ind.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATKINSON Co., Rochester, N. Y.
(See page 315.)

ATLAS Brass Foundry Co., 980-90 S. Front St., Columbus, O.

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

BLAKE, Edwin J., 565 Windsor St., Hartford, Conn.

BRASS & Aluminum Foundry & Machine Co., 364 Trombly St., Detroit, Mich.

BUCKEYE Brass & Mfg. Co., 1807 Columbus Rd., Cleveland, O.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O.
(See page 345.)

CHAMPION Brass Works, Coldwater, Mich.

CITY Brass Foundry Co., 5310 St. Clair Ave., N. E., Cleveland, O.

CONESTOGA Job & Brass Foundry, 246 N. Christian St., Lancaster, Pa.

CRAMP & Sons Ship & Engine Bldg. Co., William, Philadelphia, Pa.
(See page 257.)

D'ESTE Co., Julian, 24 Canal St., Boston, Mass.

DELAWARE Brass & Aluminum Co., Muncie, Ind.

Complete Index to Classification appears on Pages 8 to 26.

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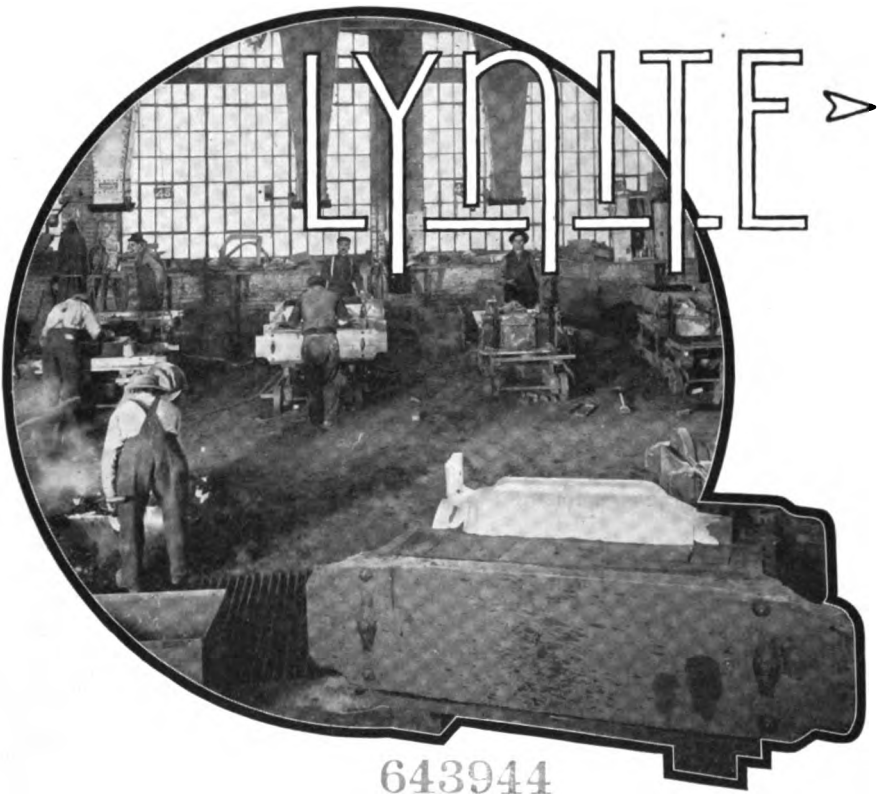

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Mixing Brains with the Sand

It's just one point of efficiency; but it illustrates the working principle that turns out better castings for you, and delivers them on time to the minute.

The molders in this picture are real molders. They do not spend half their time in shoveling sand or in fetching and carrying.

Molding, setting cores, pouring and dumping goes on continuously as if by clock-work.

The used sand goes through the grating and is taken by a conveyor to the mixer. Back it comes overhead and down through the chute into the flask when the molder pulls a lever.

Every man is carefully trained to do his task in the one best way, with the fewest operations.

Back of efficiency is organization and experience.

The result is the best possible castings at the lowest cost consistent with high quality.

It applies not only to automobile castings but to a great variety of other work in LYNITE or LYNUX.

The application of LYNITE to automobile parts, and many other uses, is increasing very rapidly. Light, strong and reliable, it may solve a manufacturing problem for you. Tell us what you are doing and see if we cannot help.

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CASTINGS (Continued)

ALUMINUM CASTINGS (Continued)

DIAMOND Brass Foundry & Machine Co., 1115 Washington Blvd., Chicago, Ill.

DORCHESTER Brass & Aluminum Foundry, Old Sturtevant Bldg. (Jamaica Plain), Boston, Mass.

ERIE Specialty Co., 505 W. 12th St., Erie, Pa.

ESSEX Brass Foundry Co., Sixth & Harvard Sts., Cambridge, Mass.

EXETER Machine Works, Pittston, Pa.

FARIES Mfg. Co., Decatur, Ill.

FRIES & Co., Buffalo, N. Y.

FRONTIER Engineering Co., 816-36 Fort St., W. Detroit, Mich.

GENERAL Aluminum & Brass Mfg. Co., E. Grand Blvd. & St. Aubin Ave., Detroit, Mich.
(See pages 105 and 253.)

GENERAL Castings Co., Ford Bldg., Detroit, Mich.

GERMANN Bronze Co., 355 W. 19th St., Erie, Pa.
(See page 489.)

GERSON-CAREY Co., Kalamazoo St. & L. S. Ry., Lansing, Mich.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn.
(See page 201.)

HARLEY Co., Springfield, Mass.
(See page 105.)

HOTZ Foundry & Mfg. Co., Fremont, O.

HOWARD Metal Co., Second & Canal Sts., Reading, Pa.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

INDIANA Brass Co., 659 W. McClurg St., Frankfort, Ind.

INDIANAPOLIS Brass Co., 1012 E. Michigan St., Indianapolis, Ind.

JEFFERSON Brass Foundry, 209 King St., Brooklyn, N. Y.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

KOKOMO Brass Works, Kokomo, Ind.

LEE Co., Wm. O., Port Huron, Mich.
(See page 111.)

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 103.)

LIMERICK Co., J. Arthur, 960 N. Howard St., Baltimore, Md.
(See page 349.)

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass.

LUMEN Bearing Co., Buffalo, N. Y.
(See page 191.)

LYNITE—See Aluminum Castings Co.

McADAMITE—See United States McAdamite Metal Co.

McRAE Brass Mfg. Co., 611-19 W. Fort St., Detroit, Mich.

MACHINISTS Foundry Co., Muncie, Ind.

MILWAUKEE Aluminum & Brass Foundry Co., 295-97 Reed St., Milwaukee, Wis.

MONUMENTAL Bronze Co., 354 Howard St., Bridgeport, Conn.

NABRALCO—See National Bronze & Aluminum Foundry Co.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

NATIONAL Bronze & Aluminum Foundry Co., 2539 E. 79th St., Cleveland, O. "Nabralco."

NORTH & Judd Mfg. Co., New Britain, Conn.

OBERDORFER Brass Co., M. L., 804 E. Water St., Syracuse, N. Y.

PARKER White Metal & Machine Co., Erie, Pa.
(See page 321.)

PAULSON & Son, Thomas, 97 Second Ave., Brooklyn, N. Y.
(See page 257.)

PIONEER Brass Works, Indianapolis, Ind.
(See page 211.)

PROVIDENCE Brass & Aluminum Foundry, 460 Eddy St., Providence, R. I.

RACINE Aluminum & Brass Foundry Co., 1329 12th St., Racine, Wis.

RACINE Brass & Iron Co., 1327 Racine St., Racine, Wis.

REEVES & Co., Paul S., 1415-25 Catharine St., Philadelphia, Pa.

RINCON Foundry Co., 349-65 Seventh St., San Francisco, Cal.

ROSTAND Mfg. Co., Milford, Conn.

RUTENBER Motor Co., Marion, Ind.
(See page 265.)

SAYRE Stamping Co., Sayre, Pa.

SHARP Brass Works, J. C., Boyce & 20th Sts., Chattanooga, Tenn.

SHERWOOD Brass Works, 1167 Jefferson Ave., Detroit, Mich.

SILVER Aluminum Metal Co., 294-96 Taaffe Pl., Brooklyn, N. Y.

STANDARD Brass Foundry Co., 1831 Columbus Rd., N. W., Cleveland, O.

STANDARD Brass & Iron Works, 1820 St. Paul Ave., Milwaukee, Wis.

STANDARD Foundry Co., Hartford, Conn.

TITAN Copper Products Co., Buffalo, N. Y.

TRIUMPH Electric Co. (Oakley), Cincinnati, O.

U. S. Brass & Aluminum Foundry Co., Waukesha, Wis.

UNITED States McAdamite Metal Co., Isabella Ave. & E. St., Detroit, Mich. "McAdamite."

WERRA Aluminum Foundry Co., Waukesha, Wis.
(See page 505.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WILLIAMS & Son, E. A., 105-11 Plymouth St., Jersey City, N. J.

WISCONSIN Aluminum Foundry Co., Manitowoc, Wis.

BRONZE AND BRASS CASTINGS

A. B. C. Castings Co., 6515 Carnegie Ave., S. E., Cleveland, O.

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 209.)

ADLAKE—See Adams & Westlake Co.

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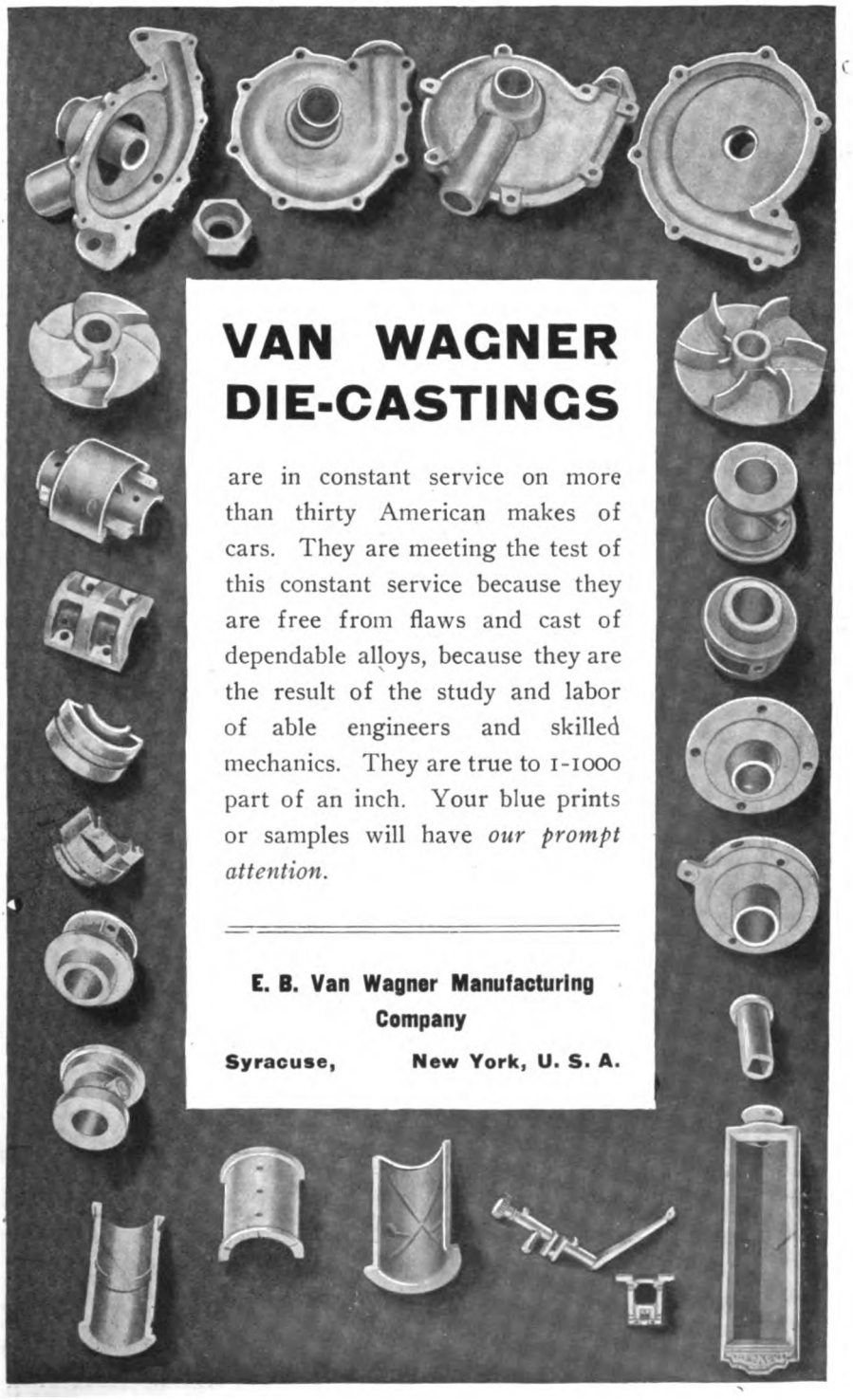

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CASTINGS (Continued)

BRONZE AND BRASS CASTINGS (Continued)

AETNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

ALUMINUM Castings Co., 6217 Carnegie Ave., Cleveland, O. "Lynux."
(See page 99.)

AMERICAN Air Compressor Co., 1523-31 W. Fort St., Detroit, Mich.

AMERICAN Brass & Iron Co., Detroit, Mich.
(See page 83.)

AMERICAN Bronze Co., 1040-80 Non-Gran Blvd., Berwyn, Pa.
(See page opposite Inside Front Cover.)

AMERICAN Bronze Co., 90-108 Arthur St., Buffalo, N. Y.

AMERICAN Car & Ship Hardware Mfg. Co., Dept. T, New Castle, Pa.
(See page 249.)

AMERICAN Castings Co., Byrket St. & L. S. & M. S. Ry., Mishawaka, Ind.

AMERICAN Manganese Bronze Co., 99 John St., New York, N. Y.

AMERICAN Pin Co., Waterbury, Conn.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ANDERSON Foundry Co., Wm. B., 24-30 S. Clinton St., Chicago, Ill.

ATKINSON Co., Rochester, N. Y. "Samson."
(See page 315.)

ATLAS Brass Foundry, 155 A St., Boston, Mass.

ATLAS Brass Foundry Co.,980-90 S. Front St., Columbus, O.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

AUBURN Foundry, Auburn, Ind.

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

BAY View Foundry Co., McDonough, Water & Shelby Sts., Sandusky, O.

BLAKE, Edwin J., 565 Windsor St., Hartford, Conn.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BRASS & Aluminum Foundry & Machine Co., 364 Trombly St., Detroit, Mich.

BUCKEYE Brass & Mfg. Co., 1807 Columbus Rd., Cleveland, O.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O.
(See page 345)

BURNS & Bassick Co., Bridgeport, Conn.
(See page 275.)

CARTER, E. T., Plainville, Conn.

CENTRAL Brass Foundry, 105-07 S. Clinton St., Chicago, Ill.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHAMPION Brass Works, Coldwater, Mich.

CITY Brass Foundry Co., 5310 St. Clair Ave., N. E., Cleveland, O.

CONESTOGA Job & Brass Foundry, 246 N. Christian St., Lancaster, Pa.

CONSOLIDATED Casting Co., Mechanicsville, N. Y.

CRAMP & Sons Ship & Engine Bldg. Co., William, Philadelphia, Pa.
(See page 257.)

DAMASCUS Bronze Co., Pittsburg, Pa.

DELTA—See Phosphor Bronze Smelting Co.

D'ESTE Co., Julian, 24 Canal St., Boston, Mass.

DETROIT Motor Casting Co., 299-303 Beaufait Ave., Detroit, Mich.

DIAMOND Brass Foundry & Machine Co., 1115 Washington Blvd., Chicago, Ill.

DORCHESTER Brass & Aluminum Foundry, Old Sturtevant Bldg. (Jamaica Plain), Boston, Mass.

EAGLE—See Stillman White Foundry Co.

EDNA Brass Mfg. Co., 525-33 Reading Rd., Cincinnati, O.

ELEPHANT—See Phosphor Bronze Smelting Co.

ELLSWORTH Brass Foundry Co., 249 R. R. Ave., Bridgeport, Conn.

ERIE Specialty Co., 505 W. 12th St., Erie, Pa.

ESSEX Brass Foundry Co., Sixth & Harvard Sts., Cambridge, Mass.

EUREKA Brass Co., 2210-18 Scott Ave., St. Louis, Mo.

EUREKA Co., North East, Pa.
(See page 255.)

EXETER Brass Works, Exeter, N. H.

EXETER Machine Works, Pittston, Pa.

FAIRVIEW Foundry Co., Detroit, Mich.

FARIES Mfg. Co., Decatur, Ill.

FRIES & Co., Buffalo, N. Y.

FRONTIER Engineering Co., 816-86 Fort St., W., Detroit, Mich.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

GENERAL Aluminum & Brass Mfg. Co., E. Grand Blvd. & St. Aubin Ave., Detroit, Mich.
(See pages 105 and 253.)

GENERAL Castings Co., Ford Bldg., Detroit, Mich.

GERMANN Bronze Co., 355 W. 19th St., Erie, Pa.
(See page 489.)

GERSON-CAREY Co., Kalamazoo St. & L. S. Ry., Lansing, Mich.

GRAHAM & Co., James, 298 Wooster St., New Haven, Conn.
(See page 201.)

GREY Mfg. Co., C. M., East Orange, N. J.

HARLEY Co., Springfield, Mass.
(See page 105.)

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HERCULES Float Works, 200-10 Franklin St., Springfield, Mass.

HOMER Brass Works, 231 Race St., Philadelphia, Pa.

HOTZ Foundry & Mfg. Co., Fremont, O.

HOWARD Metal Co., Second & Canal Sts., Reading, Pa.

IDEAL Bronze Co., 1265 E. 55th St., Cleveland, O.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

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BEARING METAL
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POTTSTOWN, PA.

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CASTINGS (Continued)

BRONZE AND BRASS CASTINGS (Continued)

INDIANA Brass Co., 659 W. McClurg St., Frankfort, Ind.

INDIANAPOLIS Brass Co., 1012 E. Michigan St., Indianapolis, Ind.

IVES Co., H. B., 5-17 Artizan St., New Haven, Conn.

JEFFERSON Brass Foundry, 209 King St., Brooklyn, N. Y.

JENKINS Brass Co., T. Robert, 527 Colvin St., Baltimore, Md.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

KOKOMO Brass Works, Kokomo, Ind.

LANGSENKAMP-WHEELER Brass Works, 1206-28 Shelby St., Indianapolis, Ind.

LEE Co., Wm. O., Port Huron, Mich.
(See page 111.)

LEVETT Co., W. M., Tenth Ave. & 36th St., New York, N. Y.

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 103.)

LIMERICK Co., J. Arthur, 960 N. Howard St., Baltimore, Md.
(See page 349.)

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass.

LUMEN Bearing Co., Buffalo, N. Y.
(See page 191.)

LUSK Bros., Foundry Co., 209-15 Van Buren St., Jackson, Mich.

LYNUX—See Aluminum Castings Co.

McGILL Metal Co., Valparaiso, Ind.

McRAE Brass Mfg. Co., 611-19 W. Fort St., Detroit, Mich.

MACHINISTS Foundry Co., Muncie, Ind.

MEDINA Stamping & Machine Co., Medina, N. Y.

METROPOLITAN Mfg. Co., 12th St. & G. T. R. R., Detroit, Mich.

MILWAUKEE Aluminum & Brass Foundry Co., 295-97 Reed St., Milwaukee, Wis.

MILWAUKEE Valve Co., 139 Burrell St., Milwaukee, Wis.

MONUMENTAL Bronze Co., 354 Howard St., Bridgeport, Conn.

MUELLER Metal Co., 288 Dyer St., Providence, R. I.

NABRALCO—See National Bronze & Aluminum Foundry Co.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

NATIONAL Bronze & Aluminum Foundry Co., 2539 E. 79th St., Cleveland, O. "Nabralco."

NOLTE Brass Co., 27-29 W. Jefferson St., Springfield, O.

NORTH & Judd Mfg. Co., New Britain, Conn.

NORWALK Brass Co., Keyser Pl., South Norwalk, Conn.

OBERDORFER Brass Co., M. L., 804 E. Water St., Syracuse, N. Y.

ONONDAGA Brass Co., Decker & Brown Sts., Syracuse, N. Y.

PARKER White Metal & Machine Co., Erie, Pa.
(See page 321.)

PAULSON & Son, Thomas, 97 Second Ave., Brooklyn, N. Y.
(See page 257.)

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant," "Delta."
(See page 471.)

PIONEER Brass Works, Indianapolis, Ind.
(See page 211.)

PITTSBURG Brass Mfg. Co., 32d St. & Penn Ave., Pittsburg, Pa.

PROGRESSIVE Brass Foundry, Keowee & Herbert Sts., Dayton, O.

PROVIDENCE Brass & Aluminum Foundry, 460 Eddy St., Providence, R. I.

RACINE Aluminum & Brass Foundry Co., 1329 12th St., Racine, Wis.

REEVES & Co., Paul S., 1415-25 Catharine St., Philadelphia, Pa.

RIDER-BAGG Co., 369 Birnie Ave., Springfield, Mass.

RINCON Foundry Co., 349-65 Seventh St., San Francisco, Cal.

ROSTAND Mfg. Co., Milford, Conn.

RUTENBER Motor Co., Marion, Ind.
(See page 265.)

SAMSON—See Atkinson Co.

SAYRE Stamping Co., Sayre, Pa.

SHARP Brass Works, J. C., Boyce & 20th Sts., Chattanooga, Tenn.

SHERWOOD Brass Works, 1167 Jefferson Ave., Detroit, Mich.

SPENCER'S Sons, I. S., Guilford, Conn.

STANDARD Brass Foundry Co., 1831 Columbus Rd., N. W., Cleveland, O.

STANDARD Brass & Iron Works, 1820 St. Paul Ave., Milwaukee, Wis.

STANDARD Foundry Co., Hartford, Conn.

STERLING Specialty Co., New Coomerstown, O.

STILLMAN White Foundry Co., 1 Bark St., Providence, R. I. "Eagle."

THIERY & Kendrick Mfg. Co., 660-64 Franklin St., Detroit, Mich.

TITAN Copper Products Co., Buffalo, N. Y.

TRIUMPH Electric Co. (Oakley), Cincinnati, O.

TURNER & Seymour Mfg. Co., Torrington, Conn.

UNIQUE Brass Foundry Co., 25 Illinois St., Buffalo, N. Y.

U. S. Brass & Aluminum Foundry Co., Waukesha, Wis.

VANADIUM Metals Co., Vanadium Bldg., Pittsburg, Pa. "Victor."

VICTOR—See Vanadium Metals Co.

WAUKESHA Foundry Co., Waukesha, Wis.

WATERBURY Mfg. Co., Waterbury, Conn.

WELLMAN Bronze Co., 6017 Superior Ave., Cleveland, O.

WELLS Chemical Bronze Works, Temple & Harding Sts., Worcester, Mass.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

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ALUMINUM AND BRASS MANUFACTURING COMPANY

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for those who demand the highest of quality and the best of service.

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21 Illinois St., Buffalo, N. Y.

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CASTINGS (Continued)

BRONZE AND BRASS CASTINGS (Continued)

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

WILLIAMS & Son, E. A., 105-11 Plymouth St., Jersey City, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

DIE CASTINGS

A. B. C. Castings Co., 6515 Carnegie Ave., S. E., Cleveland, O.

ALEMITE Metals Co., 214-20 N. Carpenter St., Chicago, Ill.

AMERICAN Die Casting Co., Vandalia Tracks & White River, Indianapolis, Ind.
(See page 505.)

AMERICAN Die Casting Co. of New York, 375-83 Kent Ave., Brooklyn, N. Y.

ATLAS Die Casting Co., 107 N. Franklin St., Syracuse, N. Y.

BLISS Co., E. W., Brooklyn, N. Y.

DOEHLER Die-Casting Co., Court & Ninth Sts., Brooklyn, N. Y.
(See page 107.)

FINISHED Parts Mfg. Co., 359 Mulberry St., Newark, N. J.

FRANKLIN Mfg. Co., 401 S. Geddes St., Syracuse, N. Y.
(See page 109.)

GERMANN Bronze Co., 355 W. 19th St., Erie, Pa.
(See page 489.)

GREY Mfg. Co., C. M., East Orange, N. J.

HARLEY Co., Springfield, Mass.
(See page 105.)

HOYT Metal Co., 300 N. Broadway, St. Louis, Mo.
(See page 109.)

INDIANA Die Casting Co., 11th & Lewis Sts., Indianapolis, Ind.

KIDDER-OSWALD Co., Dayton, O.

LEGLER-EILERMAN Co., Bacon St., Dayton, O.

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 103.)

LUMEN Bearing Co., Buffalo, N. Y.
(See page 191.)

MILWAUKEE Die Casting Co., Milwaukee, Wis.
(See page 107.)

MOBERG, C. J., 118 Pearl St., Mt. Vernon, N. Y.

MODERN Die & Tool Co., 202-04 S. Penn St., Indianapolis, Ind.

MOGUL Metal Co., Detroit, Mich.
(See page 109.)

MUZZY-LYON Co., Detroit, Mich.
(See page 109.)

NATIONAL Lead Co., New York, N. Y.
(See page 215.)

PARKER White Metal & Machine Co., Erie, Pa.
(See page 321.)

PHOENIX Die Casting Co., 21 Illinois St., Buffalo, N. Y.
(See page 105.)

PRECISION Die-Casting Co., Syracuse, N. Y.

SANFORD Co., David C., 33-39 Tulip St., Bridgeport, Conn.

STEWART Mfg. Co., J. K., Wells St. Bridge, Chicago, Ill.

STROH Die Moulded Casting Co., 161-71 Michigan St., Milwaukee, Wis.

SYRACUSE Die Moulded Casting Co., Syracuse, N. Y.

SYRACUSE Smelting Works, Jewell St., Brooklyn, N. Y.

VAN WAGNER Mfg. Co., E. B. Syracuse, N. Y.
(See page 101.)

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

WHITE Brass Casting Co., 1656 Austin Ave., Chicago, Ill.

WING & Co., J. T., 15-19 Woodward Ave., Detroit, Mich.

ZENITE Metal Co., 518 N. Capitol Ave., Indianapolis, Ind.

GRAY IRON CASTINGS

ACME Foundry Co., Detroit, Mich.

ADRIAN Steel Casting Co., Adrian, Mich.

AMERICAN Foundry & Mfg. Co., 11th & Herbert Sts., St. Louis, Mo.

AMERICAN Tool & Machine Co., Boston, Mass.
(See page 515.)

ARNOLD Co., Hoyt St., Norwalk, Conn.

ATLAS Foundry Co., Military St., Detroit, Mich.

AUBURN Foundry, Auburn, Ind.

BARLOW Foundry Co., 551 N. J. R. R. Ave., Newark, N. J.

BAY View Foundry Co., McDonough, Water & Shelby Sts., Sandusky, O.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BYRAM Foundry Co., 921 Biddle St., Indianapolis, Ind.

CAMPBELL, Wyant & Cannon Foundry Co., Muskegon, Mich.

CAPITOL Foundry Co., Hartford, Conn.

CHENEY & Son, S., Manlius, N. Y.

COLUMBIA Gray Iron Co., Second & Linden Sts., Columbia, Pa.

CONSOLIDATED Castings Co., Mechanicsville, N. Y.

CRAMP & Sons Ship & Engine Bldg. Co., William, Philadelphia, Pa.
(See page 257.)

DEAN Mfg. Co., 262 Front St., Newport, Ky.

DETROIT Foundry Co., N. Grand Blvd. & Riopelle St., Detroit, Mich.

ELEVATOR Supply & Repair Co., 561 W. Monroe St., Chicago, Ill.

EMPIRE Foundry Co., Jersey Ave., New Brunswick, N. J.

EMPIRE Foundry Co., 203 Temple St., Syracuse, N. Y.

ENTERPRISE Foundry Co., 1127-57 E. Warren Ave., Detroit, Mich.

FAIRVIEW Foundry Co., Detroit, Mich.

Complete Index to Classification appears on Pages 8 to 26.

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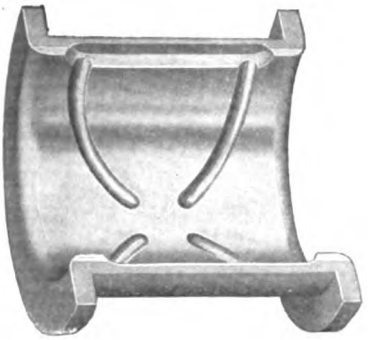

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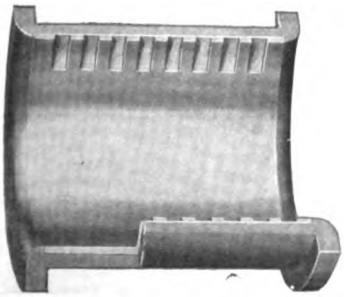

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ACCURACY
QUALITY AND
PROMPT SERVICE

MILWAUKEE, WISCONSIN

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GRAY IRON CASTINGS (Continued)

FANNER Mfg. Co., Brookside Pk., Cleveland O.

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.

FRONTIER Iron Works, 41 Letchworth St., Buffalo, N. Y.

FULTON Foundry & Machine Co., 25 Furman St., Brooklyn, N. Y.

HALL Gas Engine Mfg. Co., Byesville, O.

HART Foundry Co., 10 Allen St., Lawrence, Mass.

HOLYOKE Motor Foundry Co., Holyoke, Mass.

HOPSON & Chapin Mfg. Co., New London, Conn.

HUBLEY Mfg. Co., Lancaster, Pa.

INTERSTATE Foundry Co., E. 61st St. & Erie R. R., Cleveland, O.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O.

LOVEWELL-HENRICI Co., 936-42 Broadway, Chelsea, Mass.

LUSK Bros., Foundry Co., 209-15 Van Buren St., Jackson, Mich.

LYCOMING Foundry & Machine Co., Williamsport, Pa.

McFARLAND Foundry & Machine Co., Trenton, N. J.

MACHINISTS Foundry Co., Muncie, Ind.

MANUFACTURERS Foundry Co., Waterbury, Conn.
(See page 413.)

MOHN & Kershner, Green St., Reading, Pa.

MOTOR Foundry Co., Detroit, Mich.

MUNCIE Foundry & Machine Co., Muncie, Ind.
(See page 485.)

NATIONAL Sewing Machine Co., Belvidere, Ill.

NEW Standard Foundry Co., Detroit, Mich.
(See page 447.)

NORTMANN-DUFFKE Foundry Co., 27th Ave. & N. W. R. R., Milwaukee, Wis.

PALMER & De Mooy Foundry Co., 1658 Leonard St., Cleveland, O.

PEQUONNOCK Foundry, Fifth St. Extension, Bridgeport, Conn.

PORTLAND Foundry & Machine Co., Portland, Ind.

RACINE Brass & Iron Co., 1327 Racine St., Racine, Wis.

RACINE Foundry Co., Tenth St. & C., M. & St. P. Ry., Racine, Wis.

REEDY Foundry Co., 4600 Iowa St., Chicago, Ill.

RELIANCE Foundry Co., Richmond, Ind.

RINCON Foundry Co., 349-65 Seventh St., San Francisco, Cal.

RUTENBER Motor Co., Marion, Ind.
(See page 265.)

SEAGER Engine Works, Lansing, Mich.

SMITH Mfg. Co., Philip, Sidney, O.

SOWERS Mfg. Co., 1300-10 Niagara St., Buffalo, N. Y.

SPENCER'S Sons, I. S., Guilford, Conn.

STANDARD Foundry Co., Forest & Kewaunee Sts., Racine, Wis.

STOWELL Mfg. & Foundry Co., South Milwaukee, Wis.

SUSQUEHANNA Casting Co., Wrightsville, Pa.

SWEET & Doyle Foundry & Machine Co. (Greene Island), Albany, N. Y.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

TURNER & Seymour Mfg. Co., Torrington, Conn.

UNION Mfg. Co., New Britain, Conn.

URICK Foundry Co., 15th & Cherry Sts., Erie, Pa.

WABASH Foundry Co., Wabash, Ind.

WAYNE Works, 16th & F. Sts., Richmond, Ind.

WEST Side Foundry Co., Watervliet, N. Y.

WESTINGHOUSE Machine Co. (E. Pittsburg), Pittsburg, Pa.

WILSON Foundry & Machine Co., Pontiac, Mich.

WISCONSIN Cylinder Foundry Co., Racine, Wis.

MALLEABLE IRON CASTINGS

ACME Steel & Malleable Iron Works, 245 Military Rd., Buffalo, N. Y.

ALBION Malleable Iron Co., Albion, Mich.

AMERICAN Malleables Co., Lancaster, N. Y.

ARCADE Malleable Iron Co., Worcester, Mass.

BADGER Malleable & Mfg. Co., South Milwaukee, Wis.

BARLOW Foundry Co., 551 N. J. R. R. Ave., Newark, N. J.

BELLE City Malleable Iron Co., Racine, Wis.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BUHL Malleable Iron Co., Wight & Adair Sts., Detroit, Mich.

CHISHOLM-MOORE Mfg. Co., Lakeside Ave., & E. 49th St., Cleveland, O.

COLUMBUS Malleable Iron Co., Curtis Ave., Columbus, O.

DAYTON Malleable Iron Co., Dayton, O.

DEVLIN Mfg. Co., Thos., Third & Lehigh Aves., Philadelphia, Pa.

EASTERN Malleable Iron Co., Naugatuck, Conn.

ERIE Malleable Iron Co., Cherry St., & E. P. R. R., Erie, Pa.

FANNER Mfg. Co., Brookside Pk., Cleveland, O.

FLAGG & Co., Stanley G., 1421 Chestnut St., Philadelphia, Pa.

FRAZER & Jones Co., Syracuse, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

GENERAL Malleable Co., Warren, O.

GLOBE Malleable Iron & Steel Co., Syracuse, N. Y.
(See page 113.)

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have a standardized uniformity of quality, density and accuracy.

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there is one suited to your purpose.

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of Bronze and Babbitt Alloys in many sizes for convenient use.

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MALLEABLE IRON CASTINGS (Continued)

ILLINOIS Malleable Iron Co., 1801-25 Diversey Blvd., Chicago, Ill.

JEWEL Steel & Malleable Co., 878 Hertel Ave., Buffalo, N. Y.

JOHNSON & Co., Isaac G., Spuyten Duyvil, New York, N. Y.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 477.)

MARION Malleable Iron Works, Marion, Ind.

MEEKER Foundry Co., 95 Clay St., Newark, N. J.

MOLINE Malleable Iron Co., St. Charles, Ill.

NATIONAL Malleable Castings Co., Cleveland, O.
(See page 473.)

NORTH & Judd Mfg. Co., New Britain, Conn.

OHIO Malleable Iron Co., Columbus, O.
(See page 111.)

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill.

PRATT & Letchworth Co., 189 Tonawanda St., Buffalo, N. Y.

RHODE Island Malleable Iron Works, Hills Grove, R. I.

SPRINGFIELD Malleable Iron Co., George St., Springfield, O.

STOWELL Mfg. & Foundry Co., South Milwaukee, Wis.

SYRACUSE Malleable Iron Works, Syracuse, N. Y.
(See page 405.)

TERRE Haute Malleable & Mfg. Co., N. 19th St., Terre Haute, Ind.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

UNITED States Malleable Iron Co., Woodville St., Toledo, O.

STEEL CASTINGS

ACME Steel & Malleable Iron Works, 245 Military Rd., Buffalo, N. Y.

ADRIAN Steel Castings Co., Adrian, Mich.

ALLISON & Co., Fifth & Market Sts., Chester, Pa.

BALDWIN Steel Co., Charleston, W. Va.

BESCO—See Buchanan Electric Steel Co.

BETHLEHEM Steel Co., Third & Poplar Sts., South Bethlehem, Pa.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BUCHANAN Electric Steel Co., Buchanan, Mich. "Besco."

BUHL Malleable Iron Co., Wight & Adair Sts., Detroit, Mich.

CHESTER Steel Castings Co., Chester, Pa.

CHICAGO Steel Foundry Co., Kedzie Ave. & 37th St., Chicago, Ill.

CINCINNATI Steel Castings Co., Queen City & Spring Grove Aves., Cincinnati, O.

CRUCIBLE Steel Casting Co., Lansdowne, Pa.

CRUCIBLE Steel Castings Co., 612 Clinton St., Milwaukee, Wis.

DAMASCUS Crucible Steel Casting Co., New Brighton, Pa.

DAYTON Steel Foundry Co., Dayton, O.

EAGAN-ROGERS Steel & Iron Co., Crum Lynne, Pa.

EASTERN Steel Castings Co., 30 Kemble St., Boston, Mass.

FARRELL-CHEEK Steel Foundry Co., Sandusky, O.

FIRTH & Son Co., Rowland, Phillipsburg, N. J.

FLAGG & Co., Stanley G., 1421 Chestnut St., Philadelphia, Pa.

FORT Pitt Steel Casting Co., McKeesport, Pa.

GERLINGER Steel Casting Co., 59th St. & National Ave., West Allis, Wis.

HESS Steel Castings Co., Bridgeton Ave. & C. R. R. of N. J., Bridgeton, N. J.

INLAND Steel Casting Co., Terra Haute, Ind.

JEWEL Steel & Malleable Co., 878 Hertel Ave., Buffalo, N. Y.

JOHNSON & Co., Isaac G., Spuyten Duyvil, New York, N. Y.

KEYSTONE Steel Casting Co., Chester, Pa.

KRUPP—See Prosser & Son.

LEBANON Steel Foundry, Lebanon, Pa.

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 477.)

MAYNARD Steel Casting Co., 710-16 Reed St., Milwaukee, Wis.

MICHIGAN Steel Casting Co., Detroit, Mich.
(See page 353.)

MILBURY Steel Foundry Co., Milbury, Mass

MILWAUKEE Steel Foundry Co., S. Water & Virginia Sts., Milwaukee, Wis.

NATIONAL Malleable Castings Co., Cleveland, O.
(See page 473.)

NATIONAL Steel Casting Co., Montpelier, Ind

PENINSULAR Steel Castings Co., Iron & Wight Sts., Detroit, Mich.

PENN Steel Castings & Machine Co., Chester, Pa.

PRATT & Letchworth Co., 189 Tonawanda St., Buffalo, N. Y.

PRIME Steel Co., Milwaukee, Wis.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 381.)

PYRO—See Swedish Crucible Steel Co.

RACINE Steel Castings Co., Racine, Wis.

RIVERSIDE Steel Casting Co., Newark, N. J.
(See page 113.)

SMITH Steel Castings Co., Geo. H., 500 Clinton St., Milwaukee, Wis.

STANDARD Steel Castings Co., Cleveland, O.

STOCK Process Steel Co., Detroit, Mich.

STRONG Steel Foundry Co., Hertel Ave. & Norris St., Buffalo, N. Y.

SWEDISH Crucible Steel Co., Detroit, Mich. "Pyro."
(See page 111.)

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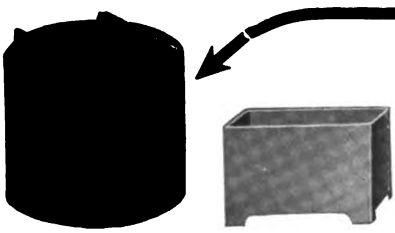

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Our Cyanide Pots have been known to stand 600 continuous hours in service under heat—a record produced by no other material.

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Manufacturers of a general line of regular and special alloy steel castings from one pound to five tons.

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Capacity, 75 to 100 tons of reliable castings daily.

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CASTINGS (Continued)

STEEL CASTINGS (Continued)

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TECO—See Treadwell Engineering Co.

TOLEDO Steel Casting Co., Toledo, O.

TREADWELL Engineering Co., Easton, Pa. "Teco."

UNION Steel Casting Co., Bartlett Sq. (Jamaica Plain), Boston, Mass.

WARREN Steel Casting Co., Lyon & Dorcas Sts., St. Louis, Mo.

WEHR Steel Co., 45th & Gordon Aves., West Allis, Wis.

WEST Steel Casting Co., 805-13 E. 70th St., Cleveland, O.

WHITELEY Steel Co., 108½ Jefferson St., Muncie, Ind.

WHITMAN Co., A. P., Fourth & Booth Sts., Chester, Pa.

CASTORS

CASTORS AND WHEEL TRUCKS

(See also Turntables, Automobile)

AUTO. & Accessories Mfg. Co., 816 W. North Ave., Baltimore, Md. "Norwood." (See page 335.)

NORWOOD—See Auto. & Accessories Mfg. Co.

WEBER Automobile Supply Co., 6 E. Kiowa St., Colorado Springs, Colo.

CATCHES

SPRING CABINET CATCHES AND FASTENERS

BRASS Goods Mfg. Co., 280 Nevins St., Brooklyn, N. Y.

BURNS & Bassick Co., Bridgeport, Conn. (See page 275.)

CORBIN Cabinet Lock Co., New Britain, Conn. (See page 243.)

READING Hardware Co., 630 S. Sixth St., Reading, Pa.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 327.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

CELLULOID

SHEET CELLULOID

(For windows in curtains and storm fronts)

ARLINGTON Co., 725-27 Broadway, New York, N. Y. "Pyralin." (See page 259.)

CELLULOID Co., 30 Washington Pl., New York, N. Y.

FIBERLOID Co., 55 Fifth Ave., New York, N. Y.

PYRALIN—See Arlington Co.

CEMENT

CAST IRON CEMENT

(For repairing cracks in castings)

BRAND Co., S. H., 559 W. Lake St., Chicago, Ill.

CENTRAL Foundry Supply Co., St. Clair Ave. & P. R. R., Columbus, O.

CLARK Cast Steel Cement Co., Shelton, Conn. "Steamtite."

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

SHANAFELT Mfg. Co., Canton, O. "X-Cel-All."

SMOOTH-ON Mfg. Co., 572-74 Communipaw Ave., Jersey City, N. J.

STEAMTITE—See Clark Cast Steel Cement Co.

X-CEL-ALL—See Shanafelt Mfg. Co.

RADIATOR REPAIR CEMENT

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. (See page 131.)

BLUE RIBBON—See International Metal Polish Co.

DIAMOND Specialty Co., Indianapolis, Ind.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie." (See page 129.)

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HOWELL & Co., 648-50 N. Robey St., Chicago, Ill. "Perfection."

INTERNATIONAL Metal Polish Co., Quill St. & Belt R. R., Indianapolis, Ind. "Blue Ribbon."

J-M Leak-No—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M "Leak-No."

JONES Auto Supply Co., 25th St. & Broadway, Oakland, Cal. "Stop-A-Leak."

LUBRO Oil Co., 116 Prospect Ave., N. W., Cleveland, O.

MARSHALL Oil Co., Marshalltown, Ia. "Stop-aleak."

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. (See page 445.)

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill. (See page 131.)

NORTHWESTERN Chemical Co., Marietta, O. "Se-Ment-Ol." (See page 129.)

PERFECTION—See Howell & Co.

RADFIX Mfg. Co., 121 Massachusetts Ave., Boston, Mass.

RADICO Mfg. Co., Springfield, Mass.

Complete Index to Classification appears on Pages 8 to 26.

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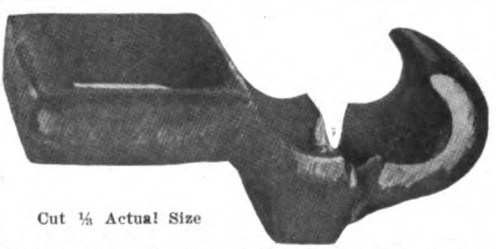

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Chain Link, Tested at Columbia University
Yield Point, 9.100 lbs.
Maximum Load, 24,100 lbs.

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CEMENT (Continued)

RADIATOR REPAIR CEMENT (Continued)

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SE-MENT-OL—See Northwestern Chemical Co.

STA-FIX—See Rub-On Mfg. Co.

STOP-A-LEAK—See Jones Auto Supply Co.

STOPALEAK—See Marshall Oil Co.

WONDER WORKER—See Hall-Thompson Co

Z & A Mfg. Co., Hazelton, N. Dak.

TIRE REPAIR CEMENT

ACME Supply Co., Ionia, Mich.

American Tire & Rubber Co., 70-78 Beach St., Akron, O. "Stickfast."

ANCHOR—See National Cement & Rubber Co.

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill.

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Tire-Doh."
(See page 131.)

BESTYET—See St. Louis Rubber Cement Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston, Mass. "Premium."

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

COX, David H., Chestnut St., Roselle, N. J.

DIAMOND Rubber Co., Akron, O. "Titan." "Seal-Tite."

DUTCH—See Van Cleef Bros.

DYKES Co., John L. G., 222 N. State St., Chicago, Ill.

ENDURANCE Tire & Rubber Co., New Brunswick, N. J.

EUREKA Cement Co., 2-6 Ave. A., Newark, N. J.

EVER RIGHT—See Fry, Keyser.

FRY, Keyser, 616-22 N. Eighth St., Reading, Pa. "Ever Right."

GEM City Liquid Vulcanizer Co., 916 E. Third St., Dayton, O. "U-Vulk."

GOODRICH Co., F. F., Akron, O. "Titan."

GOODYEAR Tire & Rubber Co., Akron, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HAZEN-BROWN Co., Court St., Brockton, Mass. "Hazenoid."

HAZENOID—See Hazen-Brown Co.

HOOD Rubber Co., Watertown, Mass.
(See page 411.)

K-C—See Western Tire & Rubber Co.

K & W Rubber Co., Orange St., Ashland, O.
(See page 493.)

LICKWID Tyre Tonic Co., 1935-37 S. 19th St., Philadelphia, Pa.

M. & M. Co., 414 Prospect Ave., Cleveland, O.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

NAM-TAY—See Yatman Rubber Co.

NARCO—See National Rubber Co.

NATIONAL Cement & Rubber Co., 300-16 S. St. Clair St., Toledo, O. "Red Cross," "Anchor," "Pioneer."

NATIONAL RUBBER CO., 4409 Papin St., St. Louis, Mo. "Narco."
(See page 131.)

P. P. & B.—See St. Louis Rubber Cement Co.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PIONEER—See National Cement & Rubber Co.

PREMIUM—See Blue Ribbon Mfg. Co.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

RED CROSS—See National Cement & Rubber Co.

RELIABLE Cement Co. (E. Akron), Akron, O.

REPUBLIC Rubber Co., Youngstown, O.

RUBBER Goods Supply & Mfg. Co., Akron, O.

S. H. Mfg. Co., 1761 Broadway, New York, N. Y.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo. "P. P. & B." "Bestyet."

SAVAGE Tire Co., Main & Sicard Sts., San Diego, Cal.

SEAL-TITE—See Diamond Rubber Co.

SEAMLESS Rubber Co., New Haven, Conn.

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

SIN-TI Rubber Co., Home Life Bldg., Washington, D. C.

STANDARD Rubber & Cable Co., Bridgeport, Conn. "Vulco."

STICKFAST—See American Tire & Rubber Co.

TINGLEY & Co., Chas. O., Rahway, N. J.

TIRE-DOH—See Atlas Auto Supply Co.

TITAN—See Diamond Rubber Co.

U-VULK—See Gem City Vulcanizer Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VAN Cleef Bros., 7709-11 Woodlawn Ave., Chicago, Ill. "Dutch."

VULCO—See Standard Rubber & Cable Co.

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YATMAN Rubber Co., 267-69 Mt. Pleasant Ave., Newark, N. J. "Nam-tay."

YOUNG, Orlando W., 277 Halsey St., Newark, N. J.

CHAIN

TRANSMISSION OR DRIVING CHAIN

AMERICAN High Speed Chain Co., Indianapolis, Ind.
(See page 229.)

BALDWIN Chain & Mfg. Co., Worcester, Mass.
(See page 241.)

BRAMPTON—See Miller, Chas. E.

COVENTRY—See Funke Co.

CULVER-TAYLOR Chain Works, 140 Madison Ave., Detroit, Mich.

DIAMOND Chain & Mfg. Co., 231 W. Georgia St., Indianapolis, Ind.

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CHAIN (Continued)

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(See page 219.)

FUNKE Co., Herbert F. L., 118 Broad St., New York, N. Y. (Importers.) "Coventry."
(See page 307.)

HAINES, Smith, 1761 Broadway, New York, N. Y. (Importer.)

LINK-BELT Co., 39th St. & Stewart Ave., Chicago, Ill.
(See page 155.)

MILLER, Chas. E., 97 Reade St., New York, N. Y. (Importer.) "Brampton."

MORSE Chain Co., Ithaca, N. Y.

RENOLD—See Frasse & Co.

WHITNEY Mfg. Co., Hartford, Conn.
(See page 115.)

CHAINS

NON-SKID CHAINS OR GRIPS

(For other Anti-Skid Devices—See Bands, Non-Skid; also Treads, Detachable)

BRO-GOR—See Brockett-Gorham Co.

BROCKETT-GORHAM Co., N. State St., Marion, O. "Bro-Gor."

EMERGENCY—See Garage Equipment Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Emergency."
(See page 87.)

GRIPPER—See Huffman Mfg. Co.

HOOVER Co., W. H., New Berlin, O.

HUFFMAN Mfg. Co., Youngstown, O. "Gripper."

LYON—See Weed Chain Tire Grip Co.

McKINNON Chain Co., 250 Amherst St., Buffalo, N. Y.

NEVER-SKID Mfg. Co., 794-98 Tenth Ave., New York, N. Y.
(See page 493.)

RID-O-SKID—See Weed Chain Tire Grip Co.

WEED Chain Tire Grip Co., Bridgeport, Conn. "Lyon," "Rid-O-Skid."
(See Inside Front Cover.)

CHANNELS

PRESSED STEEL CHANNELS

(See Frames, Pressed Steel)

CHECKS

STEERING GEAR CHECKS

BARKER, W. A., 20-22 S. Hoyne Ave., Chicago, Ill.

LITTLE STEERSMAN—See Modern Auto Appliance Co.

MODERN Auto Appliance Co., Chatham, N. Y. "Little Steersman."

CLAMPS

HOSE CLAMPS

ALLEN Mfg. Co., W. D., 133-35 W. Lake St., Chicago, Ill.
(See page 467.)

AMERICAN Stamping Co., Battle Creek, Mich.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

BEAUDETTE & Co., R. A., Chippewa Falls, Wis. "R. A. B."

BONNER Co., D. Henry, 96 Plympton St., Cambridge, Mass. "Tremo."

CATELAIN, A., 1446-48 Indiana Ave., Chicago, Ill.
(See page 467.)

CRABILL Hose Clamp Co., Battle Creek, Mich.

ERICKSON & Son, P. E., Port Chester, N. Y.

FITZGERALD Mfg. Co., Torrington, Conn.
(See page 213.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

HERZ & Co., 245 W. 55th St., New York, N. Y.
(See page 303.)

HUDSON Hose Mender Co., Melrose, Mass.

IDEAL Clamp Mfg. Co., 75 Jamaica Ave., Brooklyn, N. Y.

LAVIGNE—See Magnus Co.

MAGNUS Co., Detroit, Mich. "Lavigne."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MORGAN Mfg. Co., John St., Newport, R. I.

NEWARK Stamping Co., Newark, O. "Thompson."
(See page 551.)

R. A. B.—See Beaudette & Co.

SCHRADER'S Son, A., 783-91 Atlantic Ave., Brooklyn, N. Y.
(See page 435.)

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich.

THOMPSON—See Newark Stamping Co.

TREMO—See Bonner Co.

YERDON, Wm., Main & Center Sts., Fort Plain, N. Y.

SPRING REPAIR CLAMPS

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CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

KANTALEVER—See Motor Car Equipment Co.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. "Kantalever."

WIRE ROPE CLAMPS

BRODERICK & Bascom Rope Co., 817 N. Second St., St. Louis, Mo.

BULL DOG—See Lamson & Sessions Co.

HAZARD Mfg. Co., 81 E. Ross St., Wilkes-Barre, Pa.

LAMSON & Sessions Co., 2133 Scranton Rd., Cleveland, O. "Bull Dog."

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MACOMBER & Whyte Rope Co., 507-09 S. Clinton St., Chicago, Ill.

ROEBLINGS Sons Co., John A., Trenton, N. J.

TRENTON Iron Co., Trenton, N. J.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.

WILCOX, Crittenden & Co., 88 Main St., Middletown, Conn.

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BARNARD Specialty Co., 3300 Maple Ave., Los Angeles, Cal.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

FABRIC CLEANERS

PERCAMA—See Perkins-Campbell Co.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Percana."
(See page 48.)

GLASS WIND SHIELD CLEANERS

AMERICAN Ball Co., 115 Clifford St., Providence, R. I. "Seeclear."

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y. "Security."

KERN Mfg. Co., 68-70 E. Tupper St., Buffalo, N. Y.

MARSHALL, Walter & Co., Milwaukee, Wis.

OUTLOOK Wind Shield Cleaner Co., 2581 E. 49th St., Cleveland, O.

SECURITY—See Grossman Mfg. Co.

SEECLEAR—See American Ball Co.

CLEATS

FIBRE WIRING CLEATS

(See also Fibre, Hard)

AMERICAN Vulcanized Fibre Co, 500 Equitable Bldg., Wilmington, Del.
(See page 165.)

BLAKE Signal & Mfg. Co., 251 Causeway St., Boston, Mass.

CONCRETE Fibre Co., Ford & Lafayette Sts., Norristown, Pa.

CONTINENTAL Fibre Co., Newark, Del.
(See page 127.)

DIAMOND State Fibre Co., Elsmere, Del.
(See page 165.)

EASTERN Hard Fibre Co., 50 Church St., New York, N. Y.
(See page 165.)

NATIONAL Fibre & Insulation Co., Wilmington, Del.

SPAULDING & Sons Co., J., Wheeler St., Tonawanda, N. Y.

STANDARD Fibre Co., Miller St., Somerville, Mass.

WILMINGTON Fibre Specialty Co., Wilmington, Del.
(See page 279.)

CLIPS

CURTAIN CLIPS

(For attaching curtains to wind shields and bow sockets)

STANDARD Top & Equipment Co., 1212 Huron Rd., Cleveland, O. "Swan."

SWAN—See Standard Top & Equipment Co.

SPRING CLIPS

(See also Forgings Drop)

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CLAPP Mfg. Co., E. D., Auburn, N. Y.

CLEVELAND Hardware Co., Cleveland, O.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

ECCLES Co., Richard, Auburn, N. Y.
(See page 463.)

PAGE-STORMS Drop Forge Co., Chicopee, Mass.

SEWARD & Son Co., M., Grant Sq., New Haven, Conn.

STRIEBY & Foote Co., 301 Ogden St., Newrak, N. J.

UNION Forging Co., Union, N. Y.
(See page 473.)

WILCOX Mfg. Co., D., Mechanicsburg, Pa.

TRIMMERS CLIPS

BUSER-POSTON Tufting Machine Co., Chillicothe, O.

MEYER & Co., John C., Lowell, Mass.

CLOCKS

DASHBOARD CLOCKS

(See also Holders, Watch)

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BELMONT—See New Haven Clock Co.

BOSTON Clock Co., 16 State St., Boston, Mass.

BRIARCLIFF—See Levy & Co.

CHELSEA Clock Co., 16 State St., Boston, Mass.

COWL—See New Haven Clock Co.

COX Brass Mfg. Co., Albany, N. Y.
(See page 511.)

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CLOCKS (Continued)

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ETERNA—See Meyer, Ernest C.

FLORIDA—See Waterbury Clock Co.

JERICHO—See New Haven Clock Co.

LEVY & Co., Manasseh, 182 Broadway, New York, N. Y. "Briarcliff," "Safety."

MEYER, Ernest C., Citizens Bldg., Cleveland, O. (Importer.) "Eterna."

MINEOLA—See New Haven Clock Co.

NEW Haven Clock Co., New Haven, Conn. "Jericho," "Westbury," "Mineola," "New Ormond," "Savannah," "Belmont," "Duane," "Devere," "Cowl."

NEW ORMOND—See New Haven Clock Co.

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PENSACOLA—See Waterbury Clock Co.

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SAVANNAH—See New Haven Clock Co.

SUWANEE—See Waterbury Clock Co.

TAMPA—See Waterbury Clock Co.

TARPON—See Waterbury Clock Co.

WALTHAM Watch Co., Waltham, Mass. (See page 119.)

WATERBURY Clock Co., Waterbury, Conn "Florida," "Pensacola," "Tampa," "Ocala," "Suwanee," "Tarpon," "Arcadia," "Orlando," "Palatka."

WESTBURY—See New Haven Clock Co.

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AMERICAN Rubberfelt Co., 2215 Elston Ave., Chicago, Ill. "Arco."

ARCO—See American Rubberfelt Co.

BAYONNE—See Boyle & Co.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y. "Bayonne."

BULL DOG—See Mutty Co.

CARR Co., F. S., Boston, Mass. "Neverleek." (See page 121.)

CHANDLER Oil Cloth & Buckram Co., East Taunton, Mass.

COOK'S Linoleum Co., Trenton, N. J.

LANDERS Bros. Co., Dept. A., Toledo, O. (See page 443.)

MERITAS—See Standard Oil Cloth Co.

MONARCH Rubber & Oil Cloth Co., Drexel Bldg., Philadelphia, Pa.

MUTTY Co., L. J., Boston, Mass. "Bull Dog." (See page 237.)

NEVERLEEK—See Carr Co.

POTTER Sons & Co., Thomas, Lafayette Bldg., Philadelphia, Pa.

STANDARD Oil Cloth Co., 320 Broadway, New York, N. Y. "Meritas."

MOHAIR CLOTH

BULL DOG—See Mutty Co.

CARR Co., F. S., Boston, Mass. (See page 121.)

CHASE & Co., L. C., Boston, Mass. (See page 123.)

CLEANEASY—See Haartz, J. C.

HAARTZ, J. C., Boston, Mass. "Cleaneasy." (See page 237.)

LANDERS Bros. Co., Dept. A., Toledo, O. (See page 443.)

MUTTY Co., L. J., Boston, Mass. "Bull Dog." (See page 237.)

PICKENS Auto Cloth Co., 1777 Broadway, New York, N. Y. (Importers.)

SCHERER & Co., H., Detroit, Mich.

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HODGMAN Rubber Co., 806 Broadway, New York, N. Y. (See page 415.)

LANDERS Bros. Co., Dept. A., Toledo, O. (See page 443.)

MATTSON Rubber Co., Lodi, N. J. (See page 471.)

MONARCH Rubber & Oil Cloth Co., Drexel Bldg., Philadelphia, Pa.

MUTTY Co., L. J., Boston, Mass. "Bull Dog," "Numotor." (See page 237.)

NEVERLEEK—See Carr Co.

NUMOTOR—See Mutty Co.

PARAMOUNT—See Haartz, J. C.

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UPHOLSTERY CLOTH

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WRIGHT Wire Co., Worcester, Mass.

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AURORA Uniform Co., 44 Downer Pl., Aurora, Ill.

AUTO-SHIRT Co., Midland, Md.

AUTOMOBILE Apparel Co., Port Chester, N. Y.

BALLARD & Co., J. O., Malone, N. Y.

BEATS ALL—See Standard Oiled Clothing Co.

BISHOP Co., J. H., Wyandotte, Mich.

BLAUVELT Knitting Co., 280-84 Plane St., Newark, N. J.

BOYNTON'S Improved Process Oil Clothing Co., Vincent St., Gloucester, Mass.

BRADLEY Knitting Co., Delavan, Wis.

BURLINGTON Blanket Co., Burlington, Wis. "Chy-Nuke."

CHICAGO Auto Robe Supply Co., 12-16 S. Market St., Chicago, Ill. "Perfection."

CHY-NUKE—See Burlington Blanket Co.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

ELCO—See Loewenberg Co.

ELLSWORTH & Thayer Mfg. Co., 336-40 Broadway, Milwaukee, Wis. "Great Western."

ENCK & Keys Mfg. Co., Ashland, O.

EVERDRI—See Loewenberg Co.

FOX, Stiefel & Co., 349 Fifth Ave., New York, N. Y.

FRANKLIN Rubber Co., 105 Summer St., Boston, Mass.

FREEMAN-HIRSCHTICK Co., 227 W. Madison St., Chicago, Ill.

GEM Shirt Co., Fifth & Perry Sts., Dayton, O.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

GREAT WESTERN—See Ellsworth & Thayer Mfg. Co.

HALL & Co., R. S., Versailles, O.

HILL Mfg. Co., Richard F., 217-19 High St., Newark, N. J.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y. (See page 415.)

HUMPHREYS Sons, R. A., 1021-23 Callowhill St., Philadelphia, Pa.

JAEGERS S. W. S. Co., 395 Fourth Ave., New York, N. Y.

KENYON Co., C., Broadway & 23d St., New York, N. Y.

KLING Bros. & Co., 291 Fifth Ave., Chicago, Ill.

LARGMAN Skirt Mfg. Co., 1023-25 Vine St., Philadelphia, Pa.

LEVY & Co., M., 331 W. Broadway, New York, N. Y.

LOEWENBERG Co., 58-62 Colden St., Newark, N. J. "Everdri," "Elco."

McKIBBEN, Driscoll & Dorsey, St. Paul, Minn

MANN Co., Leon, 715-19 Broadway, New York, N. Y.

MILFORD Shoe Co., 177 Central St., Milford, Mass.

MOORE-SMITH Co., Winthrop Sq., Boston, Mass.

MORAWETZ Co., 317-25 E. Water St., Milwaukee, Wis.

NEW YORK Leather Coat Co., 33-35 Greene St., New York, N. Y.

PARKER Co., John H., 25 James St., Malden, Mass.

PERFECTION—See Chicago Auto Robe Supply Co.

PONTIAC Knitting Co., Pontiac, Mich.

REVILLON Freres, 19 W. 34th St., New York, N. Y.

ROSENTHAL & Katz, 15 W. 26th St., New York, N. Y.

ROSENWALD & Weil, 500 Franklin St., Chicago, Ill.

RUSZITS Fur Co., John, 7 E. 48th St., New York, N. Y.

SHANHOUSE & Sons, W., Rockford, Ill.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

STANDARD Oiled Clothing Co., 152d St. & Tinton Ave., New York, N. Y. "Beats All."

STAR Storm Front Co., Canal St., Troy, O.

STROH'S Detroit Overall Co., Detroit, Mich.

TOPLITZ, George, 11 E. 22d St., New York, N. Y.

TOWER Co., A. J., 22 Simmons St., Boston, Mass.

UPTHEGROVE Sporting Goods Co., Valparaiso, Ind.

WALLACE Co., Hugh, 2626 E. Grand Boulevard, Detroit, Mich.

CLUTCHES

AUTOMOBILE FRICTION CLUTCHES

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind.

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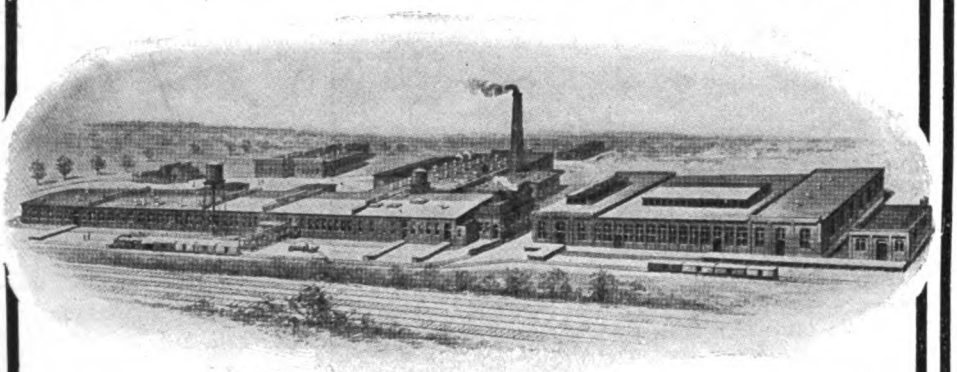
For Automobiles & Carriages



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Chase Leather

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Chase Rubber Cloths

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CLUTCHES (Continued)

AUTOMOBILE FRICTION CLUTCHES (Continued)

BORG & Beck, Moline, Ill.

CLEVELAND Clutch Co., Cleveland, O.

GOTTA Gear Co., 720-30 Sixth St., Rockford, Ill.

DETROIT Standard Gear Co., 742 Woodbridge St., E., Detroit, Mich.

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

HARTFORD Auto Parts Co., Hartford, Conn.

HELE-SHAW—See Merchant & Evans Co.

HILLIARD Clutch & Machinery Co., 104 W. Fourth St., Elmira, N. Y.

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

MERCHANT & Evans Co., Philadelphia, Pa. "Hele-Shaw."

PITTSBURGH Model Engine Co., Pittsburgh, Pa. "Wells."
(See page 401.)

PNEUMATIC Clutch-Motor Co., 812 E. Third St., Los Angeles, Cal.

POSITIVE Clutch Co., 1345 Rawson St., Chicago, Ill.

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

VERGES Mfg. Co., Fourth & Poplar Sts., Milwaukee, Wis.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 239.)

WARNER Mfg. Co., Toledo, O.
(See page 405.)

WELLS—See Pittsburgh Model Engine Co.

COATS

AUTOMOBILE COATS

(See Clothing, Motorists)

COCKS

SPRING KEY COCKS

AMERICAN Brass & Iron Co., Detroit, Mich.
(See page 83.)

CRUM-WILEY Mfg. Co., Peru, Ind.

DETROIT Brass Works, 2000 Brooklyn Ave., Detroit, Mich.

EDELMANN & Co., 225 W. Illinois St., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

STANDARD Brass Works, 528-30 Woodbridge St., E., Detroit, Mich.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

STANDARD PET COCKS

ACORN Brass Mfg. Co., 51 N. Peoria St., Chicago, Ill.

AMERICAN Brass & Iron Co., Detroit, Mich.
(See page 83.)

AMERICAN Lubricator Co., Summit Ave. & Wabash Ry., Detroit, Mich.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BELKNAP Mfg. Co., Bridgeport, Conn.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CRANE Co., 519 S. Canal St., Chicago, Ill.

CRUM-WILEY Mfg. Co., Peru, Ind.

DETROIT Brass Works, 2000 Brooklyn Ave., Detroit, Mich.

DETROIT Lubricator Co., Detroit, Mich.
(See page 245.)

EAGLE Brass Works, Dubois & Franklin Sts., Detroit, Mich.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

GREER, Frederic, 525 W. Van Buren St., Chicago, Ill.

HAYDENVILLE Co., Haydenville, Mass.

HOMER Brass Works, 231 Race St., Philadelphia, Pa.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

JARECKI Mfg. Co., Erie, Pa.

KELLY & Jones Co., Greensburg, Pa.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

McRAE & Roberts Co., 221-35 Campbell Ave., Detroit, Mich.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

MORGAN Mfg. Co., John St., Newport, R. I.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

NOLTE Brass Co., Springfield, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

REGESTER'S Sons Co., J., Holliday & Saratoga Sts., Baltimore, Md.

ROBERTS Brass Mfg. Co., 1395-1407 Fort St., W., Detroit, Mich.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

SOUTH Park Mfg. Co., Port Huron, Mich.

STANDARD Brass Works, 528-30 Woodbridge St., E., Detroit, Mich.

SWIFT Lubricator Co., Elmira, N. Y.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St., & C., B. & Q. R. R., Chicago, Ill.
(See page 327.)

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

Complete Index to Classification appears on Pages 8 to 26.

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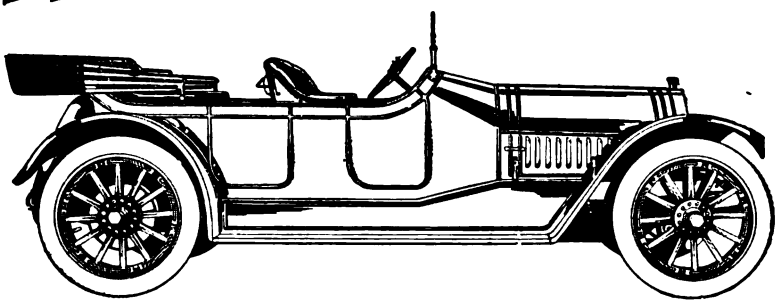
Mitchell CARS



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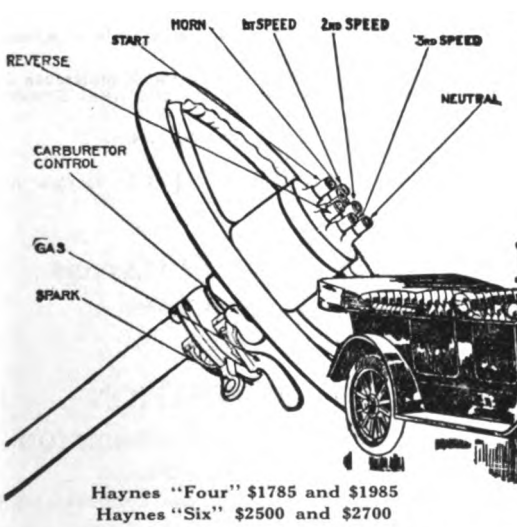

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COILS

PIPE COILS

NATIONAL Pipe Bending Co., River & Lloyd Sts., New Haven, Conn.

SPARK COILS

(See also Systems, Single Spark Ignition)

ACKLEY Electric Co., Cortland, O.

AMERICAN Coil Co., Foxboro, Mass.

AMPCO—See S-M Novelty Mfg. Co.

AUTOCOIL Co., 132 Seventh St., Jersey City, N. J.

BLACKBURN - ALLEN CO., Dayton, O. "Noxon."

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

CONNECTICUT Telephone & Electric Co., Meriden, Conn. (See pages 396A and 396B.)

CROWE—See Lisle Mfg. Co.

DAYTON-DICK Co., Quincy, Ill.

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

HEINZE Electric Co., Lowell, Mass. (See page 499.)

HERZ & Co., 245 W. 55th St., New York, N. Y. (See page 303.)

HOOSIER Coil Co., 116-20 E. Jefferson Blvd., South Bend, Ind.

J. & B. Mfg. Co., 65 Eagle St., Pittsfield, Mass.

K-W Ignition Co., 2333 Chester Ave., Cleveland, O.

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

LINDSLEY & Allen Electric Co., 257-59 Eddy St., Providence, R. I. "Solocoil."

LISLE Mfg. Co., Clarinda, Ia. "Crowe."

MENOMINEE Electric Mfg. Co., Menominee, Mich.

NATIONAL Coil Co., Lansing, Mich.

NEW York Coil Co., 338-40 Pearl St., New York, N. Y.

NOXON—See Blackburn-Allen Co.

ORSWELL Igniter Co., 37 Haverhill St., Boston, Mass. "Puritan."

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 421.)

PURITAN—See Orswell Igniter Co.

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

S. M. Novelty Mfg. Co., 52d St. & Baltimore Ave., Philadelphia., Pa. "Ampco."

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SOLOCOIL—See Lindsley & Allen Electric Co.

SPLITDORF Electrical Co., Newark, N. J. (See page 277.)

WELLS Mfg. Co., R. C., Fond du Lac, Wis.

WESTERN Electric Co., 463 West St., New York, N. Y.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

COLLECTORS

COMMERCIAL COLLECTORS

MOTOR & Accessories Adjustment Co., National Life Bldg., Chicago, Ill. (See page 127.)

COLORS

COACH COLORS

(See Paints and Colors)

COLUMNS

WATER COLUMNS AND BOILER ALARMS

RELIANCE Gauge Column Co., 45 E. Prospect St., Cleveland, O.

COMMUTATORS

ELECTRIC MOTOR COMMUTATORS

CAMERON Electrical Mfg. Co., Ansonia, Conn.

COLUMBIA Machine Works & Malleable Iron Co., Chestnut St. & Atlantic Ave., Brooklyn, N. Y.

EUREKA Co., North East, Pa. (See page 255.)

HOMER Commutator Co., 4748 Hough Ave., N. E., Cleveland, O.

SPARK COMMUTATORS

(See Timers, Ignition)

COMPOSITION

INSULATING COMPOSITION

(Substitute for Hard Rubber)

BAKELITE-DILECTO—See Continental Fibre Co.

CONDENSITE—See Duranoid Mfg. Co.

CONDENSITE Co. of America, Belleville Ave., Glen Ridge, N. J.

CONTINENTAL Fibre Co., Newark, Del. "Bakelite-Dilecto." (See page 127.)

DICKINSON Mfg. Co., ft. Mechanic St., Springfield, Mass. "Sternoid," "Stern-Condensite," "Stern-Asbestos."

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COMPOSITION (Continued)

INSULATING COMPOSITION (Continued)

DURANOID Mfg. Co., 213-19 Chestnut St., Newark, N. J. "Condensite."

ELECTROSE Mfg. Co., 70 Washington St., Brooklyn, N. Y.

GENERAL Insulate Co., 1008-14 Atlantic Ave., Brooklyn, N. Y. "Hi-Heet."

HI-HEET—See General Insulate Co.

LOVERING Co., C. P., (E. Cambridge), Cambridge, Mass.

SPECIALTY Mfg. Co., Hoosick Falls, N. Y.

STERN-ASBESTOS—See Dickinson Mfg. Co.

STERN-CONDENSITE—See Dickinson Mfg. Co.

STERNOID—See Dickinson Mfg. Co.

COMPOUNDS

ANTI-FREEZING COMPOUNDS

BLIZZARD—See Globe Soap Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

CINCINNATI Oil Works Co., Cincinnati, O. "Wizard."
(See page 417.)

ESY Mfg. Co., 1466 Michigan Ave., Chicago, Ill. "Non-Freezo."

FREZENOT—See Rub-On Mfg. Co.

GLOBE Soap Co., Cincinnati, O. "Blizzard."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

JEWEL—See Wadsworth-Howland Co.

LUBRO Oil Co., 116 Prospect Ave., N. W., Cleveland, O.

NON-FREEZO—See Esy Mfg. Co.

NORTHWESTERN Chemical Co., Marietta, O. "Thermite."
(See page 129.)

PREMIUM—See Blue Ribbon Mfg. Co.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y. "Frezenot."

THERMITE—See Northwestern Chemical Co.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WIZARD—See Cincinnati Oil Works Co.

WONDER WORKER—See Hall-Thompson Co.

CARBON REMOVING COMPOUNDS

(See also Removers, Carbon; also Machines, Motor Decarbonizing)

AMERICAN Carboneter Co., 1514 Michigan Ave., Chicago, Ill. "Carboneter."

ARROW—See Peterson Co.

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Destroyo."
(See page 131.)

AUTOPOWER—See Lakewood Chemical Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

BOYER Chemical Laboratory Co., 8 E. Michigan St., Chicago, Ill.

C-R Supply Co., 410 Elm St., Ottawa, Kans.

CAR-BON-GO—See Van Tilburg Oil Co.

CARBOLIDE Chemical Co., Monrovia, Md.

CARBON Cleaning Compound Co., 207 N. 12th St., St. Louis, Mo. "Four Sees."

CARBON-NOT Chemical Co., 271 W. 87th St., New York, N. Y.

CARBONETER—See American Carboneter Co.

CARMAS Mfg. Co., 2023 Michigan Ave., Chicago, Ill.

CHAMBERLAIN Co., Sixth Ave. & Grant St., Pittsburgh, Pa. "Desolvo."

CRIMO Co., 920 S. Sixth St., St. Joseph, Mo.

DESOLVO—See Chamberlain Co.

DESTROYO—See Atlas Auto Supply Co.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DIAMOND Specialty Co., Indianapolis, Ind.

ENGINETONE—See McCormick Mfg. Co.

FOUR SEES—See Carbon Cleaning Compound Co.

FRENCH Compression Fluide Co., 25 S. Allen Ave., Pasadena, Cal.

HALL-THOMPSON Co., Hartford, Conn. "Magic," "Wonder Worker."

HARVEY Chemical Co., 216 N. Fifth St., Lafayette, Ind.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

INDIANAPOLIS Mfg. & Sales Co., 2305 N. Delaware St., Indianapolis, Ind. "Leo."

INTER-TUBE Chemical Co., Schofield Bldg., Cleveland, O.

INTERSTATE Mfg. Co., Wollaston, Mass. "M. H. B."

JEWEL—See Wadsworth-Howland Co.

JIFFY Specialty Co., McKeesport, Pa.

KORINE Carbon Remover Co., 60 South St., Boston, Mass.

KREMBS & Co., 173 N. Green St., Chicago, Ill. "Purgcarbon."

LAKEWOOD Chemical Co., Citizens Bldg., Cleveland, O. "Autopower."

LEO—See Indianapolis Mfg. & Sales Co.

LOMASNEY & Bubb, 72 Adams St., E., Detroit, Mich.

M. H. B.—See Interstate Mfg. Co.

McCORMICK Mfg. Co., First & Sears Sts., Dayton, O. "Enginetone."

MAGIC—See Hall-Thompson Co.

METALITE Carbon Remover Co., 18-22 S. Second Ave., Marshalltown, Ia.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium."
(See page 445.)

MOTO Motor Tonic Co., Wichita, Kans.

NATIONAL Mfg. Co., 124 N. Edwards St., Kalamazoo, Mich.

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(Stops the Leaks)
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(Easier to apply than one job of polish)
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Tire Paint
Gear-Silence
Quieting Lubricant
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Valve Grinding Compound
Sil-Ver-Ol
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MARIETTA OHIO

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COMPOUNDS (Continued)

CARBON REMOVING COMPOUNDS (Continued)

NORTHWESTERN Chemical Co., Marietta, O. "Carbonox." **(See page 129.)**

O-LAX—See Wilkes & Grant Co.

ORIENT Chemical Co., Gumbel Bldg., Kansas City, Mo.

OWL—See Western Chemical Mfg. Co.

PANAMA Oil & Grease Co., 159-61 W. 51st St., New York, N. Y. "Wheatley."

PEARSON Carbon Remover Co., 809 Woodward Ave., Detroit, Mich.

PEERLESS Mfg. Co., 102d & Kempton Sts., Cleveland, O.

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PREMIUM—See Blue Ribbon Mfg. Co.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind. **(See page 500.)**

PURGCARBON—See Krembs & Co.

RADIUM—See Milwaukee Auto Specialty Co.

RELIABLE Cement Co. (E. Akron), Akron, O.

T. A. D.—See Toledo Auto Devices Co.

THERMAL Efficiency Co., Aldan, Pa. "Thermo."

THERMO—See Thermal Efficiency Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

VAN TILBURG Oil Co., 2424-28 University Ave. S. E., Minneapolis, Minn. "Car-Bon-Go."

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WESTERN Chemical Mfg. Co., 151 Sixth St., Milwaukee, Wis. "Owl."

WHEATLEY—See Panama Oil & Grease Co.

WHIZ—See Hollingshead Co.

WILKES & Grant Co., Louisville, Ky. "O-Lax."

WONDER WORKER—See Hall-Thompson Co.

WORKO Co., 1616 Winslow St., Racine, Wis.

CHEMICAL PLATING COMPOUNDS

(See also Polishes, Metal; also Enamels, Brass.)

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Silver Quick." **(See page 131.)**

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

DOZIT—See Kirk Mfg. Co.

FOREST City Sales Co., Fremont, Neb. "Quick Knick."

GUN Metal Finish Co., Main & Water Sts., Decatur, Ill.

JUSTICE Co., A. R., 607 Chestnut St., Philadelphia, Pa. "U-Kan-Plate."

KIRK Mfg. Co., Gumbel Bldg., Kansas City, Mo. "Dozit."

NORTHWESTERN Chemical Co., Marietta, O. "Sil-Ver-Ol." **(See page 129.)**

PILLSBURY Mfg. Co., 1206 Hennepin Ave., Minneapolis, Minn. "White Way."

PREMIUM—See Blue Ribbon Mfg. Co.

QUICK KNICK—See Forest City Sales Co.

SIL-VER-OL—See Northwestern Chemical Co.

SILVER QUICK—See Atlas Auto Supply Co.

U-KAN-PLATE—See Justice Co.

VAN TILBURG Oil Co., 2424-28 University Ave. S. E., Minneapolis, Minn. "Wang."

WANG—See Van Tilburg Oil Co.

WHITE WAY—See Pillsbury Mfg. Co.

GLASS WIND SHIELD COMPOUNDS

(For keeping glass clear in rain or fog; For Mechanical Cleaners—See Cleaners, Glass Wind Shield)

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "See-Kleer." **(See page 131.)**

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

KLEAR-VIEU Co., 1789 Broadway, New York, N. Y.

PREMIUM—See Blue Ribbon Mfg. Co.

RELIABLE Cement Co. (E. Akron), Akron, O.

SEE-KLEER—See Atlas Auto Supply Co.

VAN TILBURG Oil Co., 2424-28 University Ave. S. E., Minneapolis, Minn. "Wang."

WANG—See Van Tilburg Oil Co.

WONDER WORKER—See Hall-Thompson Co.

PUNCTURE SEALING COMPOUNDS

A. B. C.—See Pneumatic Tire Fluid Co.

BAER Mfg. Co., North American Bldg., Philadelphia, Pa. "Tireen."

BUFFALO Specialty Co., 375 Ellicott St., Buffalo, N. Y. "Rubberstone."

DERRICKSON Mfg. Co., 217 W. Main St., Muncie, Ind. "No-Air-Out."

FIBER Mfg. Co., 1649 Court Pl., Denver, Colo. "Joy-Ride."

INTERSTATE Puncture Proof Co., Gas & Electric Bldg., Denver, Colo.

JIFFY Specialty Co., McKeesport, Pa.

JOY-RIDE—See Fiber Mfg. Co.

KOR-KER—See Puncture Cure Sales Co.

L-TY-TO—See Schofield Laboratories Co.

MEND-A-LEAK—See Springfield Mend-a-Leak Co.

NO-AIR-OUT—See Derrickson Mfg. Co.

PNEUMATIC Tire Fluid Co., 1732-50 Wazee St., Denver, Colo. "A. B. C."

PUNCTURE Cure Sales Co., 12 Bridge St., Newark, N. J. "Kor-Ker." **(See page 487.)**

PUNCTUREMEND Co., 1220 W. Sixth St., Cleveland, O.

RUBBERSTONE—See Buffalo Specialty Co.

SCHOFIELD Laboratories Co., 2619 Lexington Ave., Kansas City, Mo. "L-Ty-To."

Complete Index to Classification appears on Pages 8 to 26.

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NEMO

"NEMO" YO LIQUID STORAGE BATTERIES
HARD RUBBER AIR DRYING ENAMEL
RADIATOR CEMENT
MOHAIR TOP WATER PROOFING
MOHAIR TOP CLEANER
CYLINDER ENAMELS
ENAMEL LEATHER DRESSING
TOP LINING DYE
ORANGE SHELLAC
BRAZING COMPOUND
TIRE LIFE
ALUMINUM PAINT
SOAP STONE
FORD REFINISHING OUTFIT
READYHOT BRAZING AND SOLDERING TORCH
RELUSTRO BODY POLISH
ENAMELAC

SEND FOR ILLUSTRATED CATALOG

Nemo Chemical & Specialty Mfg. Co.

GENERAL SALES OFFICES
PAUL G. NIEHOFF & CO.
201 Thompson Bldg.
CHICAGO ILLINOIS

GUARANTEED TIRE DOH PRODUCTS

Sold on a Money-back Guarantee to Dealer and Consumer

Every One a Necessity For the Man Who Drives a Car

Tire-Doh—Easiest and cheapest puncture and blow-out repairer, $1.00.
Day Tire Valve, Set of 5—50c.
Silver Quick—$1.00.
Stop That Radiator Leaking—50c.
No More Rust Rim Paint—50c., 85c.
Chemico Blowout Patch—50c., 75c., $1.00, $1.25.
Blac-Namel—75c.
Ever Wear Nickel Polish—25c., 50c., 75c., $1 25.
Body Gloss—50c., 85c., $1.50, $2.50.
X-Ray Top Dressing—75c., $1.25, $2.00.
No-Leak Top Dressing—75c., $1.25, $2.00.
Sunshine Metal Polish—25c., 50c., 75c., $1.25.
See-Kleer—50c.
Metal-Lac—75c.
Destroy-O Carbon Remover—75c.
Preserv-O Tire Paint—50c., $1.00, $1.75. $3.00.
Renew-O Leather Dressing—75c., $1.25, $2.00.
Nu-Stain Lining Dye—50c., 85c.
Sta-On Engine Paint—40c., 75c.
Send for booklet describing products in detail, and write for our special introductory offer.

Atlas Auto Supply Company
3240 W. Lake Street CHICAGO, ILL.

DEALERS! AGENTS!

Investigate This at Once.

NATIONAL RUBBER TIREFILLER is the livest accessory on the market today, and offers an exceptional opportunity for a good man in your section to get into a big paying business. The field is unlimited—every car owner is a prospect—it has been proven a perfect success beyond the least doubt—has been sold all over the United States for the past three years. We are putting on a big advertising campaign and will help you sell it. Let us give you full particulars and sample. Write at once.

National Rubber Filler Co.
Midlothian, Texas

HEALS Tire Cuts

NARCO TIRE CUT FILLER

The Motorist's Self-Vulcanizer

fills the cuts and holes, solidifies quickly and becomes like a part of the tire. Easy to use—clean cut, fill with Narco T. C. F., allow to stand over night: result—a new tire.

Very Large Tube $1.00—$1.50 in Canada

NATIONAL RUBBER COMPANY
4409 Papin St. St. Louis, Mo.

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COMPOUNDS (Continued)

PUNCTURE SEALING COMPOUNDS (Continued)

SEALO Tire Co., 14 E. Jackson Blvd., Chicago, Ill.

SIN-TI Rubber Co., Home Life Bldg., Washington, D. C.

SPRINGFIELD Mend-A-Leak Co., Springfield, O. "Mend-A-Leak."

TIREEN—See Baer Mfg. Co.

TURNER-BIRDSEL Co., Springfield, O.

RADIATOR CLEANING COMPOUNDS

APEX—See U. S. Compound Co.

BANNER—See Cortland Specialty Co.

C-R Supply Co., 410 Elm St., Ottawa, Kans. "Radi-No-Leak."

COLZA Chemical Co., Mutual Life Bldg., Buffalo, N. Y.

CORTLAND Specialty Co., 174-78 Railroad St., Cortland, N. Y. "Banner."

DECALCIFIER—See Milwaukee Auto Specialty Co.

FIELD Auto Compound Mfg. Co., Auburn, Me.

FLUFF-FOE—See Garratt-Callahan Co.

GARRATT-CALLAHAN Co., 37 S. Clinton St., Chicago, Ill. "Fluff-Foe."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Decalcifier."
(See page 445.)

RADI-NO-LEAK—See C-R Supply Co.

RADIATOL—See Wills Chemical Co.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

U. S. Compound Co., 1425 Seneca St., Buffalo, N. Y. "Apex."

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

VELVET—See Sutherland & Co.

WILLS Chemical Co., Board of Trade Bldg., Wheeling, W. Va. "Radiatol."

WONDER WORKER—See Hall-Thompson Co.

TIRE FILLING COMPOUNDS

AMERICAN Kushion-Kore Tire Co., 65 Main St. Buffalo, N. Y. "Kushion-Kore."

CLARKS Resilient Tire Filler Co., Thomasville, Ga.

CUMBERLAND—See New York Tire Filler Co.

DAHL Punctureless Tire Co., 501 First St., N. E., Minneapolis, Minn.

ESSENKAY Products Co., 543 Orleans St., Chicago, Ill.

KUSHION-KORE—See American Kushion-Kore Tire Co.

MILLER'S Inner Tire Core Co., 14th & Clifton Sts., Washington, D. C.

MINDEASE Co., 119 N. Tenth St., Louisville, Ky.

NATIONAL Rubber Filler Co., Midlothian, Texas.
(See page 131.)

NATIONAL Tire Filler Co., 1415 Scribner Ave., N. W., Grand Rapids, Mich.

NEW York Tire Filler Co., 204-06 W. 75th St., New York, N. Y. "Cumberland."

NEWMASTIC Co., 151 W. 68th St., New York, N. Y.

PATENT Rubber Co., 1926 Broadway, New York, N. Y.

PERFECTION Filler Co., Middlesex Ave., Somerville, Mass.

RUBERNIX Mfg. Co., 329 Broadway, Toledo, O.

ZILIO Mfg. Co., Unity Bldg., Chicago, Ill.

ZIP Co., Niagara Falls, N. Y.

TIRE PRESERVING COMPOUNDS

BIGGER Rubber Preservative Co., 567 Washington St., Buffalo, N. Y.

LASTO Chemical Co., 229-31 W. 42d St., New York, N. Y.

TIRE REPAIR COMPOUNDS

(For filling cuts in outer casings)

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O. "Stickfast."

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Tire-Doh."
(See page 131.)

BESTYET—See St. Louis Rubber Cement Co.

C. O. T. GUM GUM—See Tingley & Co.

COX, David H., Chestnut St., Roselle, N. J.

CUT-WELD—See Keystone Rubber Mfg. Co.

EMPIRE Rubber & Tire Co., Mulberry St., & Clinton Ave., Trenton, N. J.

FIRESTONE Tire & Rubber Co., Akron, O.

GOODRICH Co., B. F., Akron, O. "Seal-Tite."

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Selbst-Gemacht."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HAZEN-BROWN Co., Court St., Brockton, Mass. "Nu-Tread."

K & W Rubber Co., Orange St., Ashland, O.
(See page 493.)

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa. "Cut-Weld."

KNEAD-IT—See M. & M. Mfg. Co.

KUSHION-KORE—See American Kushion-Kore Tire Co.

LEE Tire & Rubber Co., Conshohocken, Pa. "Sure-Lee Fixit."

M. & M. Mfg. Co., Akron, O. "Knead-it."

MASTIC—See Michelin Tire Co.

MICHELIN Tire Co., Milltown, N. J. "Mastic."

MOLD-IT—See Van Cleef Bros.

NARCO—See National Rubber Co.

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Automobile Advertising Complete

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reaches 100,000 motor-using and motor-buying enthusiasts.

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separate the big purchasing power into four logical divisions t

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ENGINEERS, CAR MAKERS, EXPERT MECHANICAL AND TECHNICAL MOTORISTS, DEALERS

This scientific clientele is indispensable to the manufacturers of accessories, parts and complete cars. It is most important to convince the best posted of the merits of your production.

19000

MOTOR AGE

SPORTSMEN, MOTORISTS, WELL POSTED AND INFLUENTIAL OWNERS, DEALERS.

The men and women who love the big out-of-doors, tourists, this big class, so vital to the manufacturer of every product of the industry, is in excess of 20,000 on the subscription lists of MOTOR AGE.

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be covered intelligently and thoroughly—it is necessary to
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JOBBERS
DISTRIBUTORS

This is the dependable journal of the Dealer, the Jobber, and the Distributor. So far as possible its appeal is directed to this distinct class. Keep all the Dealers posted on the value and selling points of your product. Eventually they will wish for your agency.

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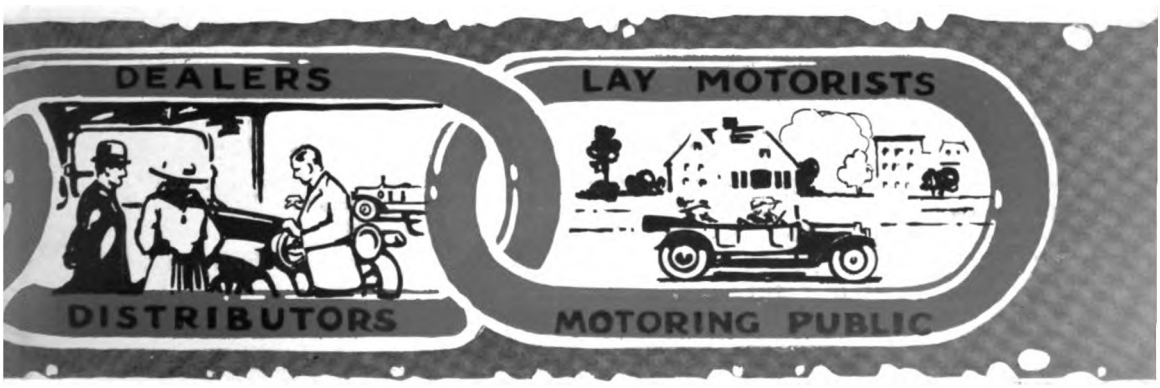
The Banker, the Lawyer, the Business man and many other non-technical classes, all combining to create a tremendous influence in motordom—are the readers of this powerful journal.

40000



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10% Manufacturers
29% Dealers
61% Motorists

MOTOR AGE
Circulation in Excess of 23,000
7% Manufacturers
28% Dealers
65% Motorists

MOTOR WORLD
Circulation in Excess of 9,000
8% Manufacturers
90% Dealers
2% Motorists

Motor Print
Circulation in Excess of 40,000
3% Manufacturers
10% Dealers
87% Motorists

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Manufacturers	5425
Dealers	24050
Motorists	61525
Total	91000

FOUR REAL SALESMEN

THE AUTOMOBILE, New York
MOTOR AGE, Chicago
MOTOR WORLD, New York
MOTOR PRINT, Philadelphia

Salesmen who sell—
because they talk directly to the class of purchasers interested.

Salesmen who attend to their own business—
because each has an individual line which interests an individual class.

Salesmen who travel separately, but still keep together—
because they sell to different classes who in many cases are interested in the same article.

Salesmen who never encroach on another's territory—
because only 2% of their trade see more than one salesman.

Salesmen in demand—
because they are paid over $140,000 by their customers to call once a week on over 40,000 and every month on over 90,000 good buyers.

By employing any or all of these FOUR SALESMEN, manufacturers selling automobiles, accessories and parts come in direct contact with only those interested in their production.

Sample copies of magazines, rate cards and further information for the asking.

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239 West 39th Street, New York

THIS COUPON WILL BRING THE INFORMATION

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239 West 39th St.,
New York.

Dear Sirs: Please send a sample copy of each of your publications together with rate cards and other information.

Yours truly,

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Address _____

Product _____

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¶ Only one chassis design can be "best"—that's why we use the same construction on the MOON "39" (a four), the MOON "48" (a four), and the MOON "65" (a six).

¶ The different models vary in size only.

Moon Motor Car Co.
Saint Louis

THE JEFFERY CHESTERFIELD SIX

Jeffery

Dominates the 1915 field of Little Sixes as positively as the Jeffery Four leads the field of Fours—as it also did in 1914.

A few specifications: European type high speed, high efficiency motor, 3 x 5; rich Tungsten valves; worm drive; full floating axle; spicer universals; Daimler leather coupling; imported ball bearings throughout; cantilever springs; Bijur starting and lighting; Stewart vacuum feed. One man top. Price $1,650.

Dealers in open territory will be interested.

The Thomas B. Jeffery Company

Main Office and Works, Kenosha, Wis., U. S. A.

"NONE AS EASY RIDING"

The King cantilever springs reduce road shock, vibration and side swing and give LONG LIFE TO YOUR CAR.

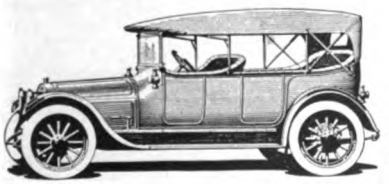
THE NEW KING
$1095

30 Horse Power, unit power plant, center control, left hand steer, electric lights, 14" x 2¼" brake drums, 112" wheel base, multiple disc clutch.

A STYLISH CAR CAREFULLY MANUFACTURED FROM MATERIALS OF GOOD QUALITY.

KING MOTOR CAR COMPANY, 1300-1304 Jefferson Ave., Detroit, Michigan, U. S. A.

Stevens-Duryea



LIVE DEALERS WANTED IN OPEN TERRITORY

Stevens-Duryea Co.,
Chicopee Falls, Mass.

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COMPOUNDS (Continued)

TIRE REPAIR COMPOUNDS (Continued)

NATIONAL Cement & Rubber Co., 300-16 S. St. Clair St., Toledo, O.

NATIONAL Rubber Co., 4409 Papin St., St. Louis, Mo. "Narco."
(See page 131.)

NU-TREAD—See Hazen-Brown Co.

PAGE-LESTER Co., 125 W. Van Buren St., Chicago, Ill. "Titewad."

QUAKER CITY Rubber Co., 629 Market St., Philadelphia, Pa. "Quakerdo."

QUAKERDO—See Quaker City Rubber Co.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo. "Bestyet."

SEAL-TITE—See Goodrich Co.

SELBST-GEMACHT—See Gray Specialty Co.

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

STICKFAST—See American Tire & Rubber Co.

SURE-LEE FIXIT—See Lee Tire & Rubber Co.

TINGLEY & Co., C. O., Rahway, N. J. "C. O. T. Gum Gum."

TIRE-DOH—See Atlas Auto Supply Co.

TITEWAD—See Page-Lester Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O.

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill. "Mold-it."

WONDER WORKER—See Hall-Thompson Co.

VALVE GRINDING COMPOUNDS

AUTO Equipment Co., 32 Hollywood Ave., East Orange, N. J. "Eureka."

BIG 4—See Gray Specialty Co.

BORNSCHEIN & Co., John F., 6304 Wallace St., Chicago, Ill. "E. Z," "Peerless," "X, L."

BRIDGEPORT Wood Finishing Co., New Milford, Conn. "Lithowhite."

CARBORUNDUM Co., Niagara Falls, N. Y.

CLOVER Mfg. Co., Norwalk, Conn.

DIAMOND Pulvis Co., 21 Nagle Ave., New York, N. Y.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

E. Z.—See Bornschein & Co.

EUREKA—See Auto Equipment Co.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Big 4."

GRYNDYN—See Stewart & Co.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker," "Quick-Kut."

HOLLINGSHEAD, Co., R. M., Camden, N. J. "Whiz."

JIFFY Specialty Co., McKeesport, Pa.

LIGHTNING Mfg. Co., Cornish Flat, N. H.

LITHOWHITE—See Bridgeport Wood Finishing Co.

NATIONAL Valgrinok Co., 195 Church St., Newton, Mass. "Valgrinok."

NORTHWESTERN Chemical Co., Marietta, O. "Norwesco."
(See page 129.)

NORTON Co., Worcester, Mass.

NORWESCO—See Northwestern Chemical Co

PEERLESS—See Bornschein & Co.

QUICK-KUT—See Hall-Thompson Co.

RAPIDCUT—See S. B. R. Specialty Co.

RIE-NIE—See Durkee-Atwood Co.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Rapidcut."

SMITH Machine Works, Winton L., 78 Clinton St., Newark, N. J.

SMOOTH-CUT Powder Co., Flint, Mich.

STEWART & Co., 171 Broadway, New York, N. Y. "Gryndyn."

VALGRINOK—See National Valgrinok Co.

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Wang."

WANG—See Van Tilburg Oil Co.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

X. L.—See Bornschein & Co.

CONDENSERS

STEAM CONDENSERS

A-Z Co., 530 W. 56th St., New York, N. Y.

CONES

BALL CONES

(See Cups, Ball)

CONNECTIONS

BRASS WATER CONNECTIONS

AMERICAN Brass & Iron Co., Detriot, Mich.
(See page 83.)

AMERICAN Tube Bending Co., 5-9 Lawrence St., New Haven, Conn.
(See page 253.)

AMERICAN Tube Products Co., Euclid Ave. E. & Grand Trunk Ry., Detroit, Mich.

GREER, Fredric, 525 W. Van Buren St., Chicago, Ill.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

STANDARD Metalwork Co., 22-40 Prospect St., Thompsonville, Conn.

STANDARD Tool & Mfg. Co., 72 Champlain St., Detroit, Mich.

WELCH Bros., Pontiac, Mich.

WHITLOCK Coil Pipe Co., Hartford, Conn.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WILKINSON Co., Wm. H., West Medway, Mass.

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LIGGETT SPRINGS LIGGETT

SPRINGS

Open Hearth Carbon—Chrome Vanadium

The only manufacturer in the country using molten lead for heat treating springs. The results justify the expense. All springs tested by specially designed machines.

AXLES

Front—I-beam and square beds for both pleasure and commercial vehicles. Roller bearings.

Rear—Chain Drive—I-beam or square beds. Complete with hubs, roller bearings, brakes, sprockets and strut rods.

Rear—Shaft Drive—Floating type, equipped with roller bearings.

Forgings—Universal Joints, Screw Machine Work, Brass Couplings, Tees, Elbows and Check Valves.

Our product is the result of exhaustive study and research by both scientific and practical men skilled in the various arts.

Inquiries cheerfully answered.

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General Office, Park Bldg., Pittsburg, Pa.

Spring and Forging Plant
Monongahela, Pa.

Auto-Parts Plant
Cleveland, Ohio

LIGGETT AXLES LIGGETT

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CONNECTIONS (Continued)

GAS TUBING CONNECTIONS

COX Brass Mfg. Co., Albany, N. Y.
(See page 511.)

GOODWIN & Kintz Co., Winsted, Conn.

MORGAN Mfg. Co., John St., Newport, R. I.

UNIFORM Seamless Wire Co., 71 Peck St., Providence, R. I.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

STEERING CONNECTIONS

BILLINGS & Spencer Co., Hartford, Conn.

CINCINNATI Ball Crank Co., Cincinnati, O.
(See page 137.)

FOSTER Gear Co., Columbus, O.

HALL Automobile Specialties Co., Boston, Mass. "Hasco."

HASCO—See Hall Automobile Specialties Co.

MICHIGAN Electric Welding Co., 520 Hart Ave., Detroit, Mich.
(See page 593.)

S. & W.—See Schweppe & Wilt Mfg. Co.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich. "S. & W."

TIRE PUMP CONNECTIONS

ACORN—See Stevens & Co.

ADJUSTABLE Lighter Co., 18 Pearl St., Newton, Mass. "Larkin."

AUSTIN & Co., H. K., 28 Lincoln St., Reading, Mass.

BELL Pump Co., 74-78 Fort St., E. Detroit. Mich.
(See page 475.)

BOSS—See Stevens & Co.

BULL DOG—See Stevens & Co.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

ECLAIR—See Stevens & Co.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

EVERTIGHT—See Smith Bros.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GLOBE Mfg. Co., Battle Creek, Mich.

GRAB—See Motor Car Equipment Co.

GREER, Fredric, 525 W. Van Buren St., Chicago, Ill.

GURNARD Mfg. Co., Beverly, Mass. "Thumlock."

IDEAL—See Stevens & Co.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y.
(See pages 209 and 321.)

KENO—See Stevens & Co.

LARKIN—See Adjustable Lighter Co.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. "Grab."

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOERA Mfg. Co., Waterbury, Conn.

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn.
(See page 321.)

PERFECT—See Youse Co.

PERFECTION—See Stevens & Co.

ROMORT Valve Co., 701 E. Pike St., Seattle, Wash.

SCHRADER'S Son, A., 783-91 Atlantic Ave., Brooklyn, N. Y.
(See page 435.)

SMITH Bros., 467-69 Main St., Melrose, Mass. "Evertight."

STANDARD Engineering Works, 90 Exchange St., Pawtucket, R. I.

STEVENS & Co., 375 Broadway, New York, N. Y. "Keno." "Swivel K." "Perfection." "Boss." "Bull Dog." "Acorn." "Eclair." "Ideal."
(See page 465.)

SUNDERLAND Mfg. Co., 61 E. 24th St., Chicago, Ill.

SWIVEL K—See Stevens & Co.

THUMLOCK—See Gurnard Mfg. Co.

YOUSE Co., E. S., 46 N. Fifth St., Reading Pa. "Perfect."

CONNECTORS

ACETYLENE LAMP CONNECTORS

(For Rubber Cement—See Tubing, Soft Rubber)

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

PENNFLEX—See Pennsylvania Flexible Metallic Tubing Co.

PENNSYLVANIA Flexible Metallic Tubing Co., Broad & Race Sts., Philadelphia, Pa.

BATTERY CONNECTORS

(See also Terminals, Wire)

AMERICAN Ever Ready Co., 308 Hudson St., New York, N. Y. "Bull Dog."

BARCY-NICHOLSON Co., 845 Fort St., W., Detroit, Mich.

BECCO—See Michigan Motor Specialties Co.

BLISS-CHESTER Co., Providence, R. I.
(See page 403.)

BREAZNELL, J. H., 26 Court St., Brooklyn, N. Y.
(See page 137.)

BULL DOG—See American Ever Ready Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

FAHNESTOCK Electric Co., 129 Patchen Ave., Brooklyn, N. Y.

FITZGERALD Mfg. Co., Torrington, Conn. "Perfection," "Standard."
(See page 213.)

FRANCO—See Interstate Electric Novelty Co.

GOODSON—See Graham Mfg. Co.

GRAHAM Mfg. Co., 94 Point St., Providence, R. I. "Goodson."

HANDY—See Chicago Electric Mfg. Co.

HARVARD Electric Co., 525 W. Van Buren St., Chicago, Ill.

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FORGINGS MADE TRUE TO SIZE

GEARS
AXLES
CRANKS

Our forgings are made The Champion Way—the *right* way. Some forgings we make without draft—Spring Hangers, Engine Brackets, Etc.

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We guarantee these to be the most reliable terminal connectors for wiring that are made. Vibration positively will not loosen them.

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Our dry battery connectors give perfect contact under excessive vibration.

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For all cars from a cyclecar to a five-ton truck. Also **Torsion Assemblies, Starting Cranks, Tie Rods, Brake Cams,** and all similar parts. We have a new and modern daylight plant, equipped especially for the production of these parts. Six years' experience, together with our special facilities, enables us to produce highly efficient parts, and give prompt delivery. Send us your specifications.

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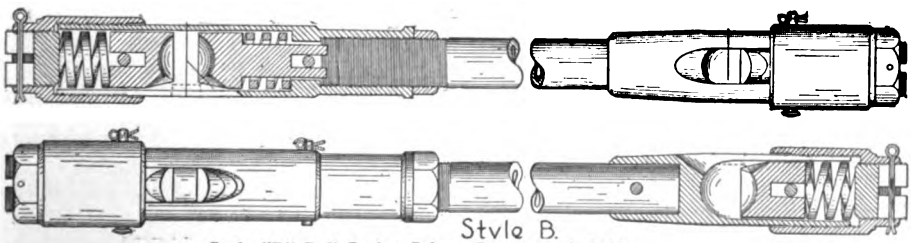
CINCINNATI OHIO



Style "B" Ball Socket Joints, Pat. Dec. 6, 1910

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CONNECTORS (Continued)

BATTERY CONNECTORS (Continued)

HERZ & Co., 245 W. 55th St., New York, N. Y.
(See page 303.)

HI-PO Waterproof Battery Co., 1007 Atlantic Ave., Brooklyn, N. Y.

INTERSTATE Electric Novelty Co., 29 Park Pl., New York, N. Y. "Franco."
(See page 347.)

KINSEY Mfg. Co., Toledo, O.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind.

LOMBARDI Motor Car Co., 67-71 Minerva St., Derby, Conn.

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco."
(See page 139.)

NATIONAL Carbon Co., Cleveland, O.

PERFECTION—See Fitzgerald Mfg. Co.

PERFECTO—See Simplex Auto Specialty Co.

SHAIN, Chas. D., Box 53, Station L., Brooklyn, N. Y.
(See page 97.)

SIMPLEX Auto Specialty Co., 783 Woodward Ave., Detroit, Mich. "Perfecto."

STANDARD—See Fitzgerald Mfg. Co.

WESTERN Electric Co., 463 West St., New York, N. Y.

ELECTRIC LAMP CONNECTORS

ANCHOR—See Metal Specialties Mfg. Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

CULVER-STEARNS Mfg. Co., Worcester, Mass.
(See page 139.)

FRANCO—See Interstate Electric Novelty Co.

HANDY—See Chicago Electric Mfg. Co.

INTERSTATE Electric Novelty Co., 29 Park Pl., New York, N. Y. "Franco."
(See page 347.)

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Anchor."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 139.)

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WARNE-DOUGLAS Co., Bronson, Mich.

WESTERN Electric Co., 463 West St., New York, N. Y.

CONTROLLERS

ACETYLENE LAMP CONTROLLERS

(See also Regulators, Acetylene Pressure.)

CRUM-WILEY Mfg. Co., Peru, Ind.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.
(See page 509.)

ELECTRIC MOTOR CONTROLLERS

(For varying speed of electric vehicles)

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis.
(See page 185.)

GENERAL Electric Co., Schenectady, N. Y.

WESTERN Electric Co., 463 West St., New York, N. Y.

WESTINGHOUSE Electric & Mfg. Co. (E Pittsburg), Pittsburg, Pa.

SPEED CONTROLLERS

(For keeping the speed of a car below predetermined limits)

PIERCE Speed Controller Co., Anderson, Ind.

COOLERS

WATER COOLERS

(See Radiators, Water Cooling)

COPPER

SHEET AND ROD COPPER

(See Brass, Sheet)

TUBE COPPER

(See Tubing, Brass)

CORDS

SEAMING CORDS

MEYER & Co., John C., Lowell, Mass.

CORK

BRAKE AND CLUTCH INSERTS

CORK Insert Co., 164 Federal St., Boston, Mass.

COUNTER-SHAFTS

FINISHED COUNTER-SHAFTS

BALL—See New York Gear Works.

DETROIT Gear & Machine Co., Detroit, Mich.
(See page 187.)

DETROIT Standard Gear Co., 742 Woodbridge St., E., Detroit, Mich.

Complete Index to Classification appears on Pages 8 to 26.

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High Grade Electrical Specialties

We are headquarters on Electrical Specialties for Automobiles, Motor Boats and Motor Cycles. **Write for our Catalog.**

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MANUFACTURERS
610-612-614 Broadway
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Auto Electric Lighting Specialists
Manufacturers of

Ediwan Sockets and Connectors,
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Metal Flexible Lamp Connections,
Complete Metal Flexible Assemblies,
Lighting Switches,
Single Wire Fittings,
Special Fittings and Lamps to B/P.

Our No. 77 Plug is the finest made for metal tubing
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TUBING FOR ALL PURPOSES
RADIATOR HOSE
WATER HOSE
STEAM HOSE
BUMPERS
BLOW-OUT PATCHES
RELINERS
REPAIR STOCKS
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SPECIALTIES MOLDED TO ORDER

Manufactured by
The Cincinnati Rubber Mfg. Co.
Cincinnati, Ohio, U.S A.

"BECCO" SPECIALTIES SAVE TROUBLE

A FULL line of *TERMINALS*, for ignition starter and lighting systems.

All sizes and types *OIL CAN HOLDERS* for trucks and pleasure cars.

WRENCH SETS for Motorcycles adapted for small bolts and nuts.

TOOL CASES made of steel with a place for each tool—much neater, handier and cleaner than tool rolls.

TIRE GRIPS to help replace Clincher tires used on all Ford cars.

HYDRAULIC DYNAMOMETERS for motor block tests, rear axle and complete chassis tests in factories.

CABLE ASSEMBLIES for ignition, lighting and starter systems.

More than sixty manufacturers are using the various specialties as standard equipment.

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Michigan Motor Specialties Company
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Detroit, Mich.

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COUNTER-SHAFTS (Continued)

FINISHED COUNTER-SHAFTS (Continued)

EVANS—See Merchant & Evans Co.

LEFEVER Arms Co., 1 Maltbie St., Syracuse, N. Y.

MERCHANT & Evans Co., Philadelphia, Pa. "Evans."

MUNCIE Gear Works, Muncie, Ind.

NEW YORK Gear Works, 56-58 Greenpoint Ave., Brooklyn, N. Y. "Ball." (See page 469.)

RUSSEL Motor Axle Co., North Detroit, Mich. (See page opposite last page.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y. (See page 513.)

SHELDON Axle Co., Wilkes-Barre, Pa. (See page 283.)

TIMKEN-DETROIT Axle Co., Detroit, Mich.

WARNER Mfg. Co., Toledo, O. (See page 405.)

COUPLINGS

HOSE COUPLINGS

(See Clamps, Hose)

MAGNETO COUPLINGS

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

WERNER Coupling Co., 931 Dauphin St. Philadelphia, Pa.

PIPE COUPLINGS

(See Fittings, Pipe)

TUBE COUPLINGS

(See Unions, Tubing)

COVERS

AUTOMOBILE COVERS

(For covering automobiles when in the garage)

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

DAFOE-EUSTICE Co., Jefferson Ave. & Antoine St., Detroit, Mich. "Duk-Bak."

DUK-BAK—See Dafoe-Eustice Co.

FULTON Bag & Cotton Mills, Atlanta, Ga. "Shuredry."

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HUMPHREYS Sons, R. A., 1021-23 Callowhill St., Philadelphia, Pa.

LANDERS Bros. Co., Dept. A., Toledo, O. (See page 443.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

SHUREDRY—See Fulton Bag & Cotton Mills.

LAMP COVERS

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y. (See page 207.)

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOHNET & Co., John, Grand Ave. & Washtenaw St., Lansing, Mich.

ECONOMY Stay Co., Jefferson City, Mo.

FALLS City Buggy Top Co., 128-30 S. Floyd St., Louisville, Ky.

GIFFORD & Son, John A., 25 Park Pl., New York, N. Y. "Tompkins."

GILBERT Mfg. Co., New Haven, Conn.

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HOPEWELL Bros., Newton, Mass. (See page 97.)

LANDERS Bros. Co., Dept. A., Toledo, O. (See page 443.)

NATHAN Novelty Mfg. Co., 906. Reade St., New York, N. Y. (See page 347.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

TOMPKINS—See Gifford & Son.

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

LEATHER MAGNETO COVERS

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

BAUER-LEWIS Co., 363 Holden Ave., Detroit, Mich.

CAMPBELL—See Perkins-Campbell Co.

DAFOE-EUSTICE Co., Jefferson Ave. & Antoine St., Detroit, Mich. "Duk-Bak."

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich. (See page 69.)

DUK-BAK—See Dafoe-Eustice Co.

ECONOMY Stay Co., Jefferson City, Mo.

GILBERT Mfg. Co., New Haven, Conn.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HOOVER Co., W. H., New Berlin, O.

LEATHER Products Co., 2268 Spring Grove Ave., Cincinnati, O.

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell." (See page 48.)

REINHOLD Belting & Supply Co., 499 Atlantic Ave., Brooklyn, N. Y.

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

Complete Index to Classification appears on Pages 8 to 26.

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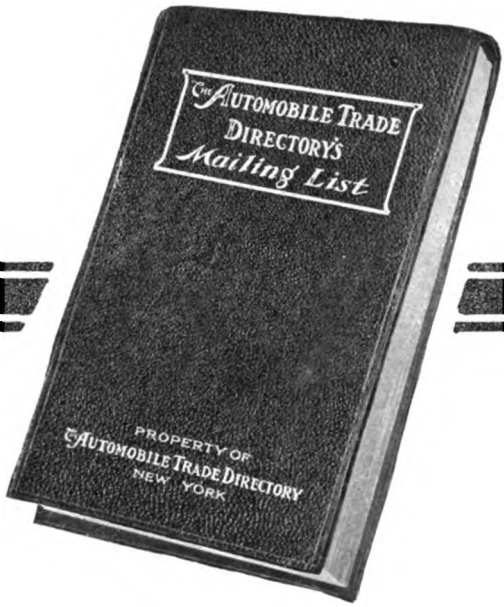

The Standard list of those who sell to the automobile trade. It embraces the entire purchasing power of every phase of the automobile and motor truck industry, comprising the dealers, garages, repair shops, supply houses and Purchasing Agents, Engineers and other officials of automobile, commercial vehicle, cycle car and motor manufacturers.

Every name given is a live and legitimate concern or business man, conducting a business as listed. To keep pace with changes both of personnel and activities of various concerns complete supplement and revision sheets are furnished the first of each month.

Write us for sample sheets and particulars.

The Automobile Trade Directory

241-243 West 39th Street, New York

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COVERS (Continued)

LEATHER MAGNETO COVERS (Continued)

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STEVENS & Bro., A. A., 1224 Wabash Ave., Chicago, Ill.

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

OIL HOLE COVERS

APEX—See Lonergan Co.

BAY State Stamping Co., 380 Chandler St., Worcester, Mass. "Bennett," "Handy."

BENNETT—See Bay State Stamping Co.

BOWEN Mfg. Co., Auburn, N. Y. (See page 149.)

CRUM-WILEY Mfg. Co., Peru, Ind.

DETROIT Lubricator Co., Detroit, Mich. (See page 245.)

ELLIOTT Chemical Works, Newton, Mass.

GITS Bros. Mfg. Co., 557 Quincy St., Chicago, Ill.

GREER, Frederic, 525 W. Van Buren St., Chicago, Ill.

HANDY—See Bay State Stamping Co.

LONERGAN Co., J. E., 211-15 Race St., Philadelphia, Pa. "Apex." (See page 459.)

OSGOOD Lubricator Co., J. L., 45 Pearl St., Buffalo, N. Y.

TUCKER, W. H. & C. F., Hartford, Conn. (See page 143.)

WAHLSTROM Tool Co., 346 Carroll St., Brooklyn, N. Y.

WINKLEY Co., Detroit, Mich. (See page 79.)

PAPER SHIPPING COVERS

SAFEPACK Paper Mills, 411 Court St., Brockton, Mass.

SEINSHEIMER Paper Co., York St. & McLean Ave., Cincinnati, O.

RADIATOR AND HOOD COVERS

(To prevent the water freezing in cold weather)

ANTIDAM—See Glover Equipment Co.

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y. (See page 207.)

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

AUTO Cape Top Co., 2334 Michigan Ave., Chicago, Ill.

AYRES & Sons, Wm., Cumberland & Third Sts., Philadelphia, Pa.

B. E. Mfg. Co., 38 White St., New York, N. Y.

BONDY Mfg. Co., 3112 Euclid Ave., Cleveland, O. "Tesmer," "Imperial."

BOYER-SCHLISKE Co., 1171 Van Dyke Ave., Detroit, Mich.

DAFOE-EUSTICE Co., Jefferson Ave. & Antoine St., Detroit, Mich. "Duk-Bak."

DETROIT Slip Cover Co., 1225 Woodward Ave., Detroit, Mich.

DUK-BAK—See Dafoe-Eustice Co.

GILLIAM Mfg. Co., Canton, O.

GLOVER Equipment Co., Indianapolis, Ind. "Antidam." (See page 415.)

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HANISCH Sons, R., 123-27 N. Halsted St., Chicago, Ill.

IMPERIAL—See Bondy Mfg. Co.

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

SIEDER Mfg. Co., 31-33 E. Woodbridge St., Detroit, Mich.

TESMER—See Bondy Mfg. Co.

VEHICLE Top & Supply Co., 3414 Lindell Ave., St. Louis, Mo. "Vesco."

VESCO—See Vehicle Top & Supply Co.

SLIP COVERS

(See also Tops, Automobile)

AUTO Protector Co., 58 Tyler St., Springfield, Mass. "Dandyfit." (See page 83.)

BUOB & SCHEU, 401 Court St., Cincinnati, O.

CAMPBELL—See Perkins-Campbell Co.

CENTRAL Auto Top Co., 330 N. Illinois St., Indianapolis, Ind.

DANDYFIT—See Auto Protector Co.

GATES Mfg. Co., 530 N. Capitol Ave., Indianapolis, Ind.

GECO—See Glover Equipment Co.

GLOVER Equipment Co., Indianapolis, Ind "Geco" (See page 415.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell." (See page 48.)

PHILLIPS Auto Seat Cover Co., 244-50 W. 49th St., New York, N. Y. "Sure Fit." (See page 539.)

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

SURE FIT—See Phillips Auto Seat Cover Co.

STARTING CRANK COVERS

(See Holders, Starting Crank)

STEERING KNUCKLE COVERS

(See Boots, Steering Knuckle)

STEERING WHEEL COVERS OR GRIPS

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

CANCOS Mfg. Co., 146 N. Second St., Philadelphia, Pa. "Steerease."

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TUCKER POSITIVE LOCK COMPRESSION GREASE CUPS

No. 000—

Pat. Jan. 11th, 1910

POSITIVE LOCK CUP

Fitted with barrel lock. This cup is not a ratchet action, is self-locking in either direction and is in a class alone.

It is designed for the builder of high-grade motor cars who want the best equipment that money can buy to put into their product. Cap member with lock can be fitted to head of spring shackle bolts with minimum expense.

No springs to depress when feeding the lubricant.

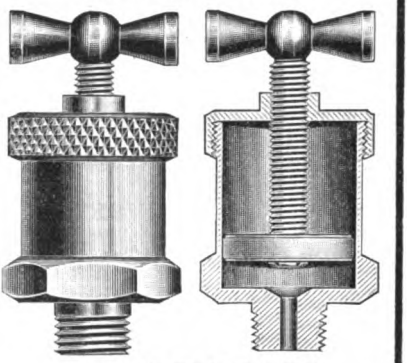
No friction but the grease.

MADE IN THREE SIZES

000	3/4	1/8	Pipe
00	1	1/8	"
0	1 1/4	1/4	"

SEND FOR GREASE CUP CATALOGUE

MARINE TYPE



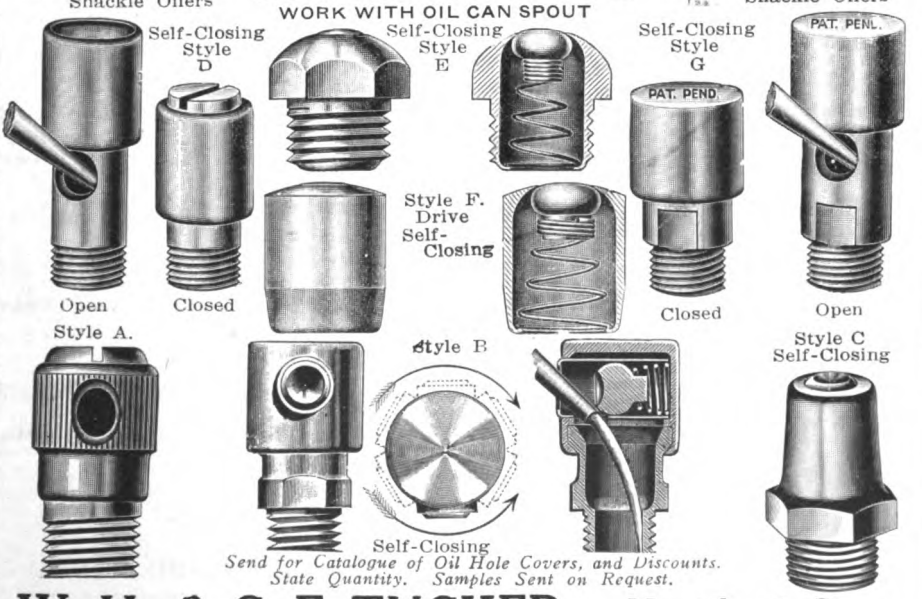
MADE IN THREE SIZES

0000	1/4 x 32 5/16 x 32	and 1/8 Pipe
000	1/8 Pipe	
00	1/8 Pipe	

TUCKER OIL HOLE COVERS

THE SAFETY FIRST KIND

WORK WITH OIL CAN SPOUT



Send for Catalogue of Oil Hole Covers, and Discounts. State Quantity. Samples Sent on Request.

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COVERS (Continued)

STEERING WHEEL COVERS OR GRIPS (Continued)

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

EZE-GRIP—See Hayne-Surridge Auto Goods Co.

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HAYNE-SURRIDGE Auto Goods Co., 1017 Lucas Ave., St. Louis, Mo. "Eze-Grip."

NATHAN Novelty Mfg. Co., 90 G Reade St., New York, N. Y.
(See page 347.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

PARKER-STEARNS & Co., 286 Sheffield Ave., Brooklyn, N. Y.

STEEREASE—See Cancos Mfg. Co.

TIRE COVERS

(See Cases, Tire and Tube)

TOP COVERS

(See also Tops, Automobile)

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 88 White St., New York, N. Y.

BOHNET & Co., John, Grand Ave. & Washtenaw St., Lansing, Mich.

BUOB & SCHEU, 401 Court St., Cincinnati, O.

DETROIT Slip Cover Co., 1225 Woodward Ave., Detroit, Mich.

FALLS City Buggy Top Co., 128-30 S. Floyd St., Louisville, Ky.

GECO—See Glover Equipment Co.

GLOVER Equipment Co., Indianapolis, Ind "Geco"
(See page 415.)

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HANISCH Sons, R., 123-27 N. Halsted St., Chicago, Ill.

LONDON Auto Supply Co., 2540-48 Wabash Ave., Chicago, Ill.

MICHIGAN Top Co., 313 Riopelle St., Detroit, Mich.

MILWAUKEE Trimming Co., 549 E. Water St., Milwaukee, Wis.

NATHAN Novelty Mfg. Co., 90 G. Reade St., New York, N. Y.
(See page 347.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

SPRINGFIELD Auto Top & Upholstering Co., 224-30 Dwight St., Springfield, Mass.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

VESCO—See Vehicle Top & Supply Co.

CRANKS

SAFETY STARTING CRANKS

CLARK Crank Co., Johnson Bldg., Muncie, Ind.

PERKINS & Son, B. F., 2 Crescent St., Holyoke, Mass.

PROSSER Engineering Co., 2108 W. Superior Ave., Cleveland, O.

R. & B. Mfg. Co., 5525 Woodland Ave., Philadelphia, Pa. "Rohrer."

ROHRER—See R. & B. Mfg. Co.

WINK Mfg. Co., 2100 W. Superior Ave., Cleveland, O.

CRANKSHAFTS

FINISHED OR MACHINED CRANKSHAFTS

(For Crankshafts in the rough—See Forgings, Drop)

ALLISON & Co., Fifth & Market Sts., Chester, Pa.

ATLAS Mfg. Co., Fostoria, O.
(See page 145.)

AUTO Crankshaft Co., 192-96 Piquette Ave., Detroit, Mich.
(See page 147.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

FORE River Shipbuilding Corp., Quincy, Mass.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 429.)

JACKSON Motor Shaft Co., Jackson, Mich.
(See page 93.)

JOLIET Forge Co., Irving & Franklin Sts., Joliet, Ill.

LELAND-GIFFORD Co., 1025 Southbridge St., Worcester, Mass.

MICHIGAN Crank Shaft Co., Lansing, Mich.
(See page 149.)

MUSKEGON Motor Specialties Co., Muskegon, Mich.
(See page 91.)

NATIONAL Engineering Co., Saginaw, Mich.
(See page 471.)

NORTON Grinding Co., New Bond St., Worcester, Mass.

OBENBERGER Drop Forge Co., Milwaukee, Wis.
(See page 475.)

PARK Drop Forge Co., Cleveland, O.
(See page 145.)

PENINSULA Auto Parts Co., Lafayette Ave., E., Detroit, Mich.

STANDARD Gauge Steel Co., Beaver Falls, Pa.
(See page 339.)

TINDELL-MORRIS Co., Eddystone, Pa.

UNION Drop Forge Co., 358 W. Indiana St., Chicago, Ill.

WYMAN & Gordon Co., Worcester, Mass.
(See Back Bone.)

CUPS

BALL CUPS AND CONES

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 247.)

Complete Index to Classification appears on Pages 8 to 26.

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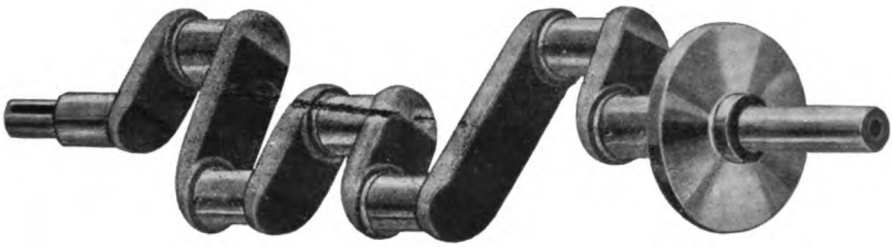
CRANK SHAFTS

COMPLETELY MACHINED, WITH GROUND BEARINGS FOR AUTOMOBILE AND MARINE MOTORS



ATLAS MANUFACTURING CO.

SEND BLUE PRINTS
FOR ESTIMATES

FOSTORIA, OHIO

STRENGTH *in* CRANK SHAFTS

WE GUARANTEE

CHEMICAL ANALYSIS - PHYSICAL PROPERTIES
PROMPT DELIVERIES

THE PARK DROP FORGE CO.

CLEVELAND, O.

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CUPS (Continued)

BALL CUPS AND CONES (Continued)

BOSSERT Co., Utica, N. Y. (See page 217.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

DETROIT Screw Works, Detroit, Mich. (See page 341.)

GIER & Dail Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 81.)

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn. (See page 297.)

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

OAKES Pressed Steel Co., Indianapolis, Ind.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., Elyria, O.

WORCESTER Pressed Steel Co., Worcester, Mass. (See page 157.)

OIL AND GREASE CUPS

(See also Lubricators; also Covers, Oil Hole)

ACTIVE—See Sherman Mfg. Co.

AGNER Co., Raymond C., Burlington, Wis. "Simplex."

AJAX—Se Allen Mfg. Co.

ALBANY Lubricating Co., 708-10 Washington St., New York, N. Y. (Grease Cups only.)

ALLEN Mfg. Co., W. D., 133-35 W. Lake St., Chicago, Ill. "Czar," "Columbia," "Peerless," "Gibbs," "Ajax," "Polar," "Pawnee," "Reliable." (See page 467.)

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMERICAN Injector Co., 173 14th Ave., Detroit, Mich.

AMERICAN Lubricator Co., Summit Ave. & Wabash Ry., Detroit, Mich.

AMERICAN Pin Co., Waterbury, Conn.

AMERICAN Stamping Co., Battle Creek, Mich.

ANSONIA Mfg. Co., Ansonia, Conn.

APEX—See Lonergan Co.

ARROW—See Long Bros.

BAILEY, Wm. J., 401 Mulberry St., Newark, N. J. "Climax."

BAY State Stamping Co., 380 Chandler St., Worcester, Mass.

BESLY & Co., Charles H., 118-24 N. Clinton St., Chicago, Ill. "Helmet."

BOWEN Mfg. Co., Auburn, N. Y. "Empress." (See page 149.)

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

BUFFALO—See Sherwood Mfg. Co.

BURNS & Bassick Co., Bridgeport, Conn. (See page 275.)

CAMDEN—See Lindholm Metal Stamping Co

CHICAGO—See Ohio Injector Co.

CLIMAX—See Bailey, Wm. J.

COLONIAL—See Powell Co.

COLUMBIA—See Allen Mfg. Co.

CRANE Co., 836 S. Michigan Ave., Chicago, Ill.

CRUM-WILEY Mfg. Co., Peru, Ind "Ideal," "Perfection."

CUTTER—See Long Bros.

CZAR—See Allen Mfg. Co.

DETROIT Lubricator Co., Detroit, Mich. (See page 245.)

EDELMANN & Co., E. 225 W. Illinois St., Chicago, Ill.

EMPRESS—See Bowen Mfg. Co.

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

GENERAL Pressed Metal Co., American & Diamond Sts., Philadelphia, Pa.

GIBBS—See Allen Mfg. Co.

GITS Bros. Mfg. Co., 557 Quincy St., Chicago, Ill.

GREER, Frederic, 525 W. Van Buren St., Chicago, Ill.

GUARDIAN—See Sherman Mfg. Co.

HANS Motor Equipment Co., La Crosse, Wis.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HELMET—See Besly & Co.

HENRY Mfg. & Grease Cup Co., Terre Haute, Ind.

IDEAL—See Crum-Wiley Mfg. Co.

IDEAL—See Lunkenheimer Co.

IMPERIAL Brass Mfg. Co, 1200 W. Harrison St., Chicago, Ill. (See page 329.)

KELLY & Jones Co., Greensburg, Pa.

LINDHOLM Metal Stamping Co., 107-15 Erie St., Camden, N. J. "Vale," "Camden," "Madeira," "McKee," "Simplex," "Reno." (See page 149.)

LION—See Lunkenheimer Co.

LONERGAN Co., J. E., 211-15 Race St., Philadelphia, Pa. "Apex." (See page 459.)

LONG Bros., Broadway & Buckeye St., Kokomo, Ind. "Arrow," "Cutter."

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O. "Ideal," "Lion," "Pioneer," "Royal," "Sentinel," "Tiger."

M & E—See Merchant & Evans Co.

McKEE—See Lindholm Metal Stamping Co.

McRAE & Roberts Co., 221-35 Campbell Ave., Detroit, Mich.

MADEIRA—See Lindholm Metal Stamping Co.

MECCA—See Powell Co.

MECHANICAL & Electrical Mfg. Co., 2225 Prairie Ave., Chicago, Ill.

MERCHANT & Evans Co., Philadelphia, Pa. "M & E."

MICHIGAN Lubricator Co., 661-73 Beaubein St., Detroit, Mich.

MILWAUKEE Valve Co., 139 Burrell St., Milwaukee, Wis.

MOGUL—See Powell Co.

Complete Index to Classification appears on Pages 8 to 26.

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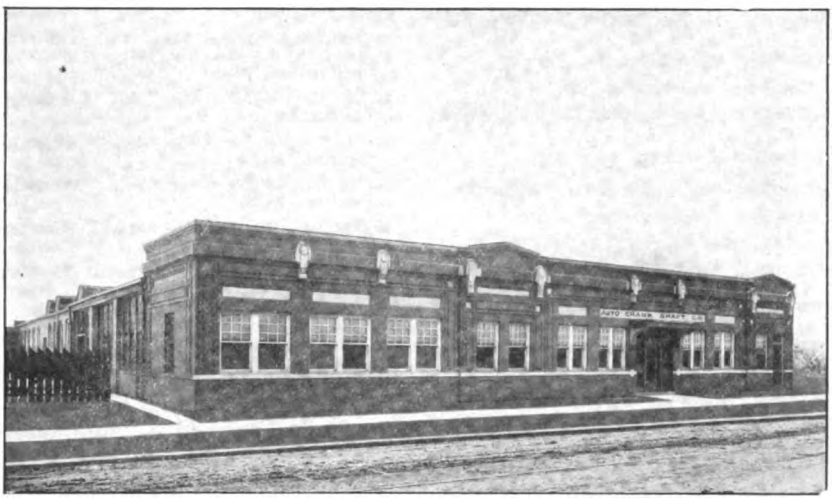

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CUPS (Continued)

OIL AND GREASE CUPS (Continued)

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

NIAGARA—See Sherwood Mfg. Co.

OHIO Injector Co., Wadsworth, O. "Chicago."

PAWNEE—See Allen Mfg. Co.

PEERLESS—See Allen Mfg. Co.

PENBERTHY Injector Co., Detroit, Mich. "Sterling."

PERFECT—See Sherman Mfg. Co.

PERFECTION—See Crum-Wiley Mfg. Co.

PIONEER—See Lunkenheimer Co.

POLAR—See Allen Mfg. Co.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O. "Mogul," "Progress," "Renown," "Vanguard," "Colonial," "Mecca."

PREMIUM—See Sherman Mfg. Co.

PROGRESS—See Powell Co.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

RELIABLE—See Allen Mfg. Co.

RENO—See Lindholm Metal Stamping Co.

RENOWN—See Powell Co.

RICH Mfg. Co., 370 Atlantic Ave., Boston, Mass.

ROYAL—See Lunkenheimer Co.

SENTINEL—See Lunkenheimer Co.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich. "Premium," "Perfect," "Guardian," "Active."

SHERWOOD Mfg. Co., 1702-16 Elmwood Ave., Buffalo, N. Y. "Niagara," "Buffalo."

SIMPLEX—See Agner Co.

SIMPLEX—See Lindholm Metal Stamping Co.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STERLING—See Penberthy Injector Co.

SWIFT Lubricator Co., Elmira, N. Y.

TIGER—See Lunkenheimer Co.

TUCKER, W. H. & C. F., Hartford, Conn. (See page 143.)

VALE—See Lindholm Metal Stamping Co.

VANGUARD—See Powell Co.

WALWORTH Mfg. Co., Boston, Mass.

WILKINSON Co., Wm. H., West Medway, Mass.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

WINKLEY Co., Detroit, Mich. (See page 79.)

ZERK Mfg. Co., Cleveland, O.

SPRING KEY PRIMING CUPS

(For ordinary priming cups—See Cocks, Standard Pet)

AMERICAN Brass & Iron Co., Detroit, Mich. (See page 83.)

AMERICAN Injector Co., 173 14th Ave., Detroit, Mich.

CRUM-WILEY Mfg. Co., Peru, Ind.

DETROIT Brass Works, 1304 Brooklyn Ave., Detroit, Mich.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. (See page 329.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McRAE & Roberts Co., 211-35 Campbell Ave., Detroit, Mich.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

STANDARD Brass Works, 528-30 Woodbridge St., E., Detroit, Mich.

SPRING LEAF OILING CUPS

BROWN, W. H., Rose Bldg., Cleveland, O.

GRUS, Jr. & Co., Wm., 5313 Wayne Ave., Chicago, Ill.

CURTAINS

SPECIAL TOP CURTAINS

COLLINS—See Novelty Leather Works.

DETROIT Flash Curtain Co., Free Press Bldg., Detroit, Mich.

JIFFY Auto Curtain Co., Dodge Power Bldg., Detroit, Mich.

NOVELTY Leather Works, Dept. E., Jackson, Mich. "Collins." (See page 517.)

SCOTT—See Star Storm Front Co.

STANDARD Division Curtain Co., 1338 Race St., Philadelphia, Pa.

STAR Storm Front Co., Canal St., Troy, O "Scott."

CUSHIONS

SPECIAL SEAT CUSHIONS

(For ordinary cushions—See Bodies; also Tops)

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

CUT-OUTS

THERMOSTATIC CUT-OUTS

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STAWIL Co., Quincy, Ill.

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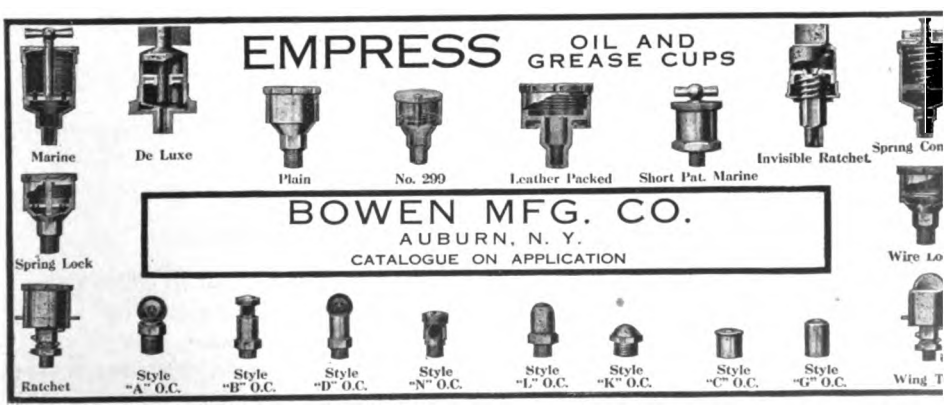

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CYLINDERS

FINISHED OR MACHINED CYLINDERS

(For cylinder castings in the rough—See Casting, Gray Iron)

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.

FULTON Foundry & Machine Co., 25 Furman St., Brooklyn, N. Y.

MANUFACTURERS Foundry Co., Waterbury, Conn.
(See page 413.)

MICHIGAN Crank Shaft Co., Lansing, Mich.
(See page 149.)

MUNCIE Foundry & Machine Co., Muncie, Ind.
(See page 485.)

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 289.)

WAINWRIGHT & Son, W. W., Connersville, Ind.
(See page 291.)

DASHES

LEATHER DASHES

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

PETERS & Herron Dash Co., Gift & Culbertson Sts., Columbus, O.

METAL DASHES

A-Z Co., 530 W. 56th St., New York, N. Y.

BRISCOE Mfg. Co., Detroit, Mich.

HAYES Mfg. Co., Detroit, Mich.

KINSEY Mfg. Co., Toledo, O.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

WOOD DASHES

AMERICAN Veneer Co., 1501 Clinton St., Hoboken, N. J.
(See page 151.)

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DETROIT Auto Dash Co., 519-21 Beaubien St., Detroit, Mich.
(See page 151.)

EGGERS Veneer Seating Co., F., Two Rivers, Wis.

HANSON-WARD Veneer Co., Bay City, Mich.
(See page 151.)

HARTFORD Pattern & Model Co., 120 Allyn St., Hartford, Conn.

INDIANA Veneer & Panel Co., New Albany, Ind.

LOUISVILLE Veneer Mills, 1122-40 Fulton St., Louisville, Ky.

NEW JERSEY Veneer Co., 258 W. Railway Ave., Paterson, N. J.

STANDARD Cabinet Mfg. Co., Peru, Ind.

WIDMAN & Co., J. C., 14th, 15th Sts. & G. T. Ry., Detroit, Mich.

WISCONSIN Seating Co., New London, Wis.

DIMMERS

HEADLIGHT DIMMERS OR SHADES

AJAX—See Wanner Mfg. Co.

CAMPBELL—See Perkins-Campbell Co.

CHANEY Co., L. F., Springfield, O.

CHICAGO Dimmer Co., 175 W. Jackson Blvd., Chicago, Ill.

COLUMBUS Ignition Lighter Co., Wyandotte Bldg., Columbus, O.

CORNING Glass Works, Corning, N. Y.

DIM-A-LITE—See Pellets Magneto Exchange.

DIMIT—See Suburban Lighting & Gas Engine Co.

DISTRIBUTORS & Manufacturers Co., 82 W. Washington St., Chicago, Ill. "Monarch."

ECLIPSE Mfg. Co., Box R. B., Auburn, N. Y. "Safety First."
(See page 151.)

ECLIPSE—See Vesta Accumulator Co.

ESSENKAY Products Co., 543 Orleans St., Chicago, Ill.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill. "Monarch."

H-M—See Mulchahey, Howard F.

H. P. B. Electric Co., 500 Fifth Ave., New York, N. Y.

JACKSON Co., Chas. D. (Motor Mart), Boston, Mass.

JONES Auto Supply Co., 25th St. & Broadway, Oakland, Cal.

LEONARD Electric Co., Ward, Bronxville, N. Y. "Nodaz."

MIDDLETON, J. G., Pittsfield, Mass.

MONARCH—See Distributors & Manufacturers Co.

MONARCH—See Fowler Lamp & Mfg. Co.

MULCHAHEY, Howard F., 8 Mt. Vernon St., Providence, R. I. "H-M."

NODAZ—See Leonard Electric Co.

PELLETS Magneto Exchange, 1606 Michigan Ave., Chicago, Ill. "Dim-a-Lite."

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell."
(See page 48.)

SAFETY FIRST—See Eclipse Mfg. Co.

SERVUS Rescue Equipment Co., 10 Johnson St., Newark, N. J.

SUBURBAN Lighting & Gas Engine Co., Summit & Lagrange Sts., Toledo, O. "Dimit."

TOBEY, Wm. L., 9 Lewis St. (E. Boston), Boston, Mass.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill. "Eclipse."

WANNER Mfg. Co., Chicago, Ill. "Ajax."

DISCS

RADIATOR DISCS OR FINS

ACKLIN Stamping Co., Toledo, O.

BRISCOE Mfg. Co., Detroit, Mich.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

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DISCS (Continued)

STEEL CLUTCH DISCS

ACKLIN Stamping Co., Toledo, O.

BOSSERT Co., Utica, N. Y.
(See page 217.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

DISSTON & Sons, Henry (Tacony), Philadelphia, Pa.

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

MOLTRUP Steel Products Co., Beaver Falls, Pa.

OLDHAM & Sons, Joshua, 114-18 Liberty St., New York, N. Y.

SIMONDS Mfg. Co., North St., Fitchburg, Mass.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

DISTRIBUTERS

SPARK DISTRIBUTERS

(See Timers, Ignition)

DRESSING

CLUTCH AND BELT DRESSING

ARMIGER Chemical Co., 2155-57 Austin Ave., Chicago, Ill. "Rex."

BORNSCHEIN & Co., John F., 6304 Wallace St., Chicago, Ill. "Sampson."

CLEVELAND Auto-Clutch Dressing Co., Cleveland, O. "Slipnot."

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Velvet."

GRIP-TITE Co., George & Church Sts., New Brunswick, N. J.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

NORTHWESTERN Chemical Co., Marietta, O.
(See page 129.)

OWL—See Western Chemical Mfg. Co.

REX—See Armiger Chemical Co.

RIE-NIE—See Durkee-Atwood Co.

SAMPSON—See Bornschein & Co.

SLIPNOT—See Cleveland Auto-Clutch Dressing Co.

VELVET—See Gray Specialty Co.

WESTERN Chemical Mfg. Co., 151 Sixth St., Milwaukee, Wis. "Owl."

WHIZ—See Hollingshead Co.

LEATHER DRESSING

ALCOVIE—See Matt & Co.

ALDER Chemical Co., Mt. Vernon, N. Y. "Star."

AMERICAN Lacquer Co., Bruce Ave., Bridgeport, Conn.

ARMIGER Chemical Co., 2155-57 Austin Ave., Chicago, Ill. "Rex."

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ARSENAL Varnish Co., Rock Island, Ill

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Renew-O."
(See page 131.)

B-BRITE—See Polish Products Co.

BANNER—See Wadsworth-Howland Co.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BAY STATE—See Wadsworth, Howland & Co.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

CENTURY—See Arnstein, Eugene.

CHICAGO White Lead & Oil Co., 1454 S. Western Ave., Chicago, Ill. "King."

COL-R-OLE—See Rub-On Mfg. Co.

COLUMBUS Varnish Co., Columbus, O. "Peerless."
(See page 281.)

CUMMER Products Co., 2150 W. 15th St., Cleveland, O. "Perfect Auto Gloss."

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich. "Rogers."

DIX Mfg. Co., Lewistown, Pa.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

EBERSON Paint Co., 18th & Pine Sts., St. Louis, Mo. "Leather-Lac."

EVERNEW—See Felton, Sibley & Co.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa. "Evernew."

FLEXO—See Rodriguez, R. E.

GENERAL Specialties Co., Colonial Bldg., Salem, Mass. "Imperial."

GLAZENE Co., 1330 W. Jackson Blvd., Chicago, Ill.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HAUTHAWAY & Sons, C. L., 346 Congress St., Boston, Mass.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

IMPERIAL—See General Specialties Co.

JEWELL Mfg. Co., 21st St. & Marshall Blvd., Chicago, Ill. "Nelsons."

JOHNSTON Paint Co., R. F., Cincinnati, O. "Leather Lac," "Top Fix."
(See page 165.)

KING—See Chicago White Lead & Oil Co.

LAWRENCE & Co., W. W., Pittsburg, Pa.

LEAKANOT—See National Rubber Co.

LEATH-R-NU—See Nu-Back Mfg. Co.

LEATHER-LAC—See Eberson Paint Co.

LEATHER LAC—See Johnston Paint Co.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

McDOUGALL Varnish Co., Buffalo, N. Y.

MARTIN, L. G., 3923 Forbes St., Pittsburg, Pa.

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Model 52—Duplex Drive Brougham—Worm Gear $3000
Model 53 — Large Forward Drive Brougham—Worm Gear.....$2950
Model 54—Large Rear Drive Brougham—Worm Gear $2950
Model 55—Bevel Gear Drive Brougham $2650

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DETROIT, MICH.

Model LB
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Detroit

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DRESSING (Continued)

LEATHER DRESSING (Continued)

MATT & Co., F., 491 Washington St., Newark, N. J. "Alcovie."

MECHEM, J. L., 118 E. Jackson St., Centerville, Ia.

MILLER Co., Frank, 349-51 W. 26th St., New York, N. Y.

MONTGOMERY-WASHBURN Co., Saugerties, N. Y.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

NATIONAL Rubber Co., 4409 Papin St., St. Louis, Mo. "Leakanot."
(See page 131.)

NATIONAL Sales Co., 2431 Vine St., Kansas City, Mo. "3-W."

NELSONS—See Jewell Mfg. Co.

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill.
(See page 131.)

NORTHWESTERN Chemical Co., Marietta, O. "Norwesco."
(See page 129.)

NORWESCO—See Northwestern Chemical Co.

NOUVEAU—See Rodriguez, R. E.

NU-BACK Mfg. Co., 114 N. Commercial St., St. Louis, Mo. "Leath-R-Nu."

NUBIAN Paint & Varnish Co., 1856 Le Claire Ave., Chicago, Ill. "Victory."

ORIENTAL Enamel Co., 963 W. Sixth St., Long Beach, Cal.

PEERLESS—See Columbus Varnish Co.

PERCAMA—See Perkins-Campbell Co.

PERFECT AUTO GLOSS—See Cummer Products Co.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Percama."
(See page 48.)

PIONEER—See Northwestern Chemical Co.

POLISH Products Co., 815-17 E. 21st St., Kansas City, Mo. "B-Brite."

RENEW-O—See Atlas Auto Supply Co.

REX—See Armiger Chemical Co.

RIE-NIE—See Durkee-Atwood Co.

RODRIGUEZ, R. E., 56-58 Warren St., New York, N. Y. "Nouveau," "Flexo."

ROGERS—See Detroit White Lead Works.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y. "Rub-R-Tite." "Col-R-Ole."

RUB-R-TITE—See Rub-On Mfg. Co.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y.

SCHMOEGER, Frederic A., Sterling, Ill. "Sterling."

STAR—See Alder Chemical Co.

STERLING—See Schmoeger, Frederic A.

3-W—See National Sales Co.

THUMB, E. W., 872 Orleans St., Chicago, Ill.

TOP FIX—See Johnston Paint Co.

VAN Cleef Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Wang."

VICTORY—See Nubian Paint & Varnish Co.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Banner."

WADSWORTH, Howland & Co., 84 Washington St., Boston, Mass. "Bay State."

WANG—See Van Tilburg Oil Co.

WEST Mfg. Co., 120-22 N. Madison St., Rockford, Ill.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

ZINSSER & Co., W., 195 William St., New York, N. Y.

MOHAIR TOP DRESSING

AMERICAN Chemical & Mfg. Co., Arcade Bldg., Norfolk, Va. "Coleman's," "Hippo."

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 129.)

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "X-Ray."
(See page 131.)

CARR CO., F. S., Boston, Mass. "Success."
(See page 121.)

COLEMAN'S—See American Chemical & Mfg. Co.

COLUMBUS Varnish Co., Columbus, O. "Peerless."
(See page 281.)

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

EVERNEW—See Felton, Sibley & Co.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa. "Evernew."

GLAZENE Co., 1330 W. Jackson Blvd., Chicago, Ill.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HIPPO—See American Chemical & Mfg. Co.

LEATH-R-NU—See Nu-Back Mfg. Co.

MILLER Co., Frank, 349-51 W. 26th St., New York, N. Y.

NATIONAL Sales Co., 2431 Vine St., Kansas City, Mo. "3-W."

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill.
(See page 131.)

NU-BACK Mfg. Co., 114 N. Commercial St., St. Louis, Mo. "Leath-R-Nu."

PEERLESS—See Columbus Varnish Co.

PERCAMA—See Perkins-Campbell Co.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Percama."
(See page 48.)

PRICE Fire & Water Proofing Co., Poughkeepsie, N. Y.

RIE-NIE—See Durkee-Atwood Co.

SLIKUP—See Arnold, N. B.

SUCCESS—See Carr Co.

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Wang."

WANG—See Van Tilburg Oil Co.

WONDER Worker—See Hall-Thompson Co.

X-RAY—See Atlas Auto Supply Co.

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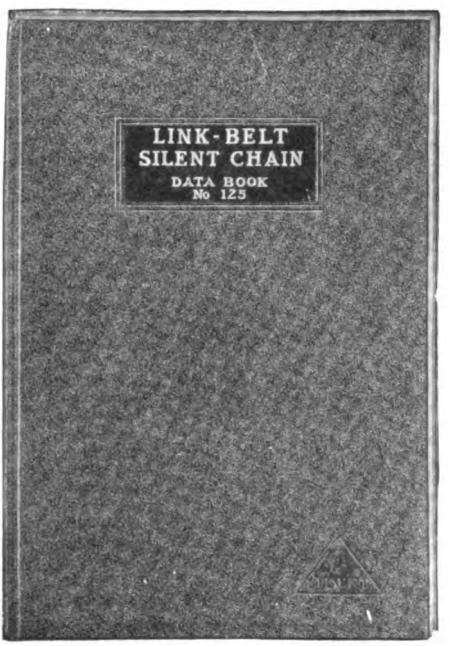

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DRUMS

PRESSED STEEL BRAKE DRUMS

(For Cast Drums—See Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 217.)

CROSBY Co., Buffalo, N. Y.
(See page 539.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

FEDERAL Pressed Steel Co., Milwaukee, Wis.
(See page 291.)

GIER & Dall Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O.
(See page 157.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KELSEY Wheel Co., Detroit, Mich.

KINSEY Mfg. Co., Toledo, O.

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

PRESSED Steel Tank Co., West Allis, Wis.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

DUSTERS

MOTORISTS DUSTERS

(See Clothing, Motorists)

DYE

TOP LINING DYE

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Nu-Stain."
(See page 131.)

COLUMBUS Varnish Co., Columbus, O.
(See page 281.)

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

NORTHWESTERN Chemical Co., Marietta, O. "Norwesco."
(See page 129.)

NORWESCO—See Northwestern Chemical Co.

NU-STAIN—See Atlas Auto Supply Co.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y.

WHIZ—See Hollingshead Co.

DYNAMOMETERS

ELECTRIC TESTING DYNAMOMETERS

ALDEN, Geo. I., 48 Queen St., Worcester, Mass.

DIEHL Mfg. Co., Elizabethport, N. J.
(See page 157.)

SPRAGUE Electric Works, 527 W. 34th St., New York, N. Y.

HYDRAULIC TESTING DYNAMOMETERS

HERSCHELL-SPILLMAN Co., North Tonawanda, N. Y.
(See page 495.)

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich.
(See page 139.)

STANDARD Motor Construction Co., 172-8 Whiton St., Jersey City, N. J.

DYNAMOS

BATTERY CHARGING DYNAMOS AND MOTOR GENERATORS

ALLIS-CHALMERS Mfg. Co., Milwaukee, Wis.

CROCKER-WHEELER Co., Ampere, N. J.

DIEHL Mfg. Co., Elizabethport, N. J.
(See page 157.)

ECK Dynamo & Motor Co., Belleville, N. J.

FAIRBANKS Morse & Co., 900 S. Wabash Ave., Chicago, Ill.

HOLTZER-CABOT Electric Co., Brookline, Mass.

KENDRICK & Davis Co., Lebanon, N. H.

LINCOLN Electric Co., 38th St. & Kelley Ave., N. E., Cleveland, O.

PEERLESS Electric Co., Warren, O.

ROBBINS & Myers Co., Lagonda Ave., Springfield, O.

ROTH Bros. & Co., Adams & Loomis Sts., Chicago, Ill.

SPRAGUE Electric Works, 527 W. 34th St., New York, N. Y.

WESTERN Electric Co., 463 West St., New York, N. Y.

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburg), Pittsburg, Pa.

ELECTRIC LIGHTING AND BATTERY CHARGING DYNAMOS

ADAMS-BAGNALL Electric Co., Cleveland, O.

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 209.)

ADLAKE—See Adams & Westlake Co.

ALLIS-CHALMERS Mfg. Co., Milwaukee, Wis.

APELCO—See Apple Electric Co.

APPLE Electric Co., Newark, N. J. "Apelco."

AUTO-LITER—See Electric Auto-Lite Co.

AUTO-SPARKER—See Motsinger Device Mfg. Co.

AUTODYNE—See Bijur Motor Lighting Co.

BIJUR Motor Lighting Co., 15th St. & River Front, Hoboken, N. J. "Autodyne."

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

BRIGGS Magneto Co., Elkhart, Ind. "Maglite."

CARLETON Co., 170 Summer St., Boston, Mass.

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HIGHEST QUALITY

PRESSED STEEL

Rear Axle Housings
Ball Cups
Shims
Segments
Bicycle Fittings

Brake Drums
Brake Guides
Covers
Quadrants
Wrenches
Joint Cases

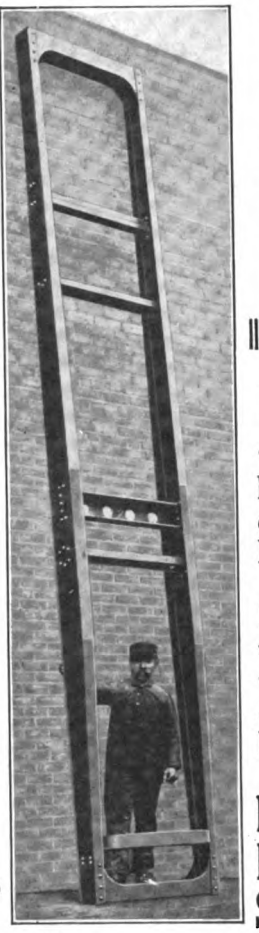
FOR AUTOMOBILES

We also cold draw seamless, stamp, press and form parts from sheet brass, bronze, copper, aluminum, etc., as well as sheet steel for any purpose.

Worcester Pressed Steel Company

Main Office and Factory

Worcester, Massachusetts



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For Pleasure Cars
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½-ton to 10-ton

Prestige

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In the same way the car which rides on a frame built by the

Hydraulic Pressed Steel Company

gains, in the buyer's eyes, the firmly established reputation for quality and leadership that goes with the "Hydraulic" name. Hydraulic Frames are silent guarantees of quality.

The Hydraulic Pressed Steel Company
3152 E. 61st St.
Cleveland, Ohio

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TYPE C. M. ELECTRIC VEHICLE MOTORS

Type CM Vehicle Motor

Standard Motor ratings cover all sizes of equipment. Small pleasure vehicle motors; Motors for Commercial truck service; Slow Speed Motors for direct connection to transmission shafts are a special feature of this line. Write for Bulletin No. 130.

Diehl Manufacturing Co.
Elizabethport, N. J.

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DYNAMOS (Continued)

ELECTRIC LIGHTING AND BATTERY CHARGING DYNAMOS (Continued)

CROCKER-WHEELER Co., Ampere, N. J.

DA-LITE—See Dayton-Dick Co.

DAYTON-DICK Co., Quincy, Ill. "Da-Lite."

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."

DEACO—See Detroit Electric Appliance Co.

DELCO—See Dayton Engineering Laboratories Co.

DETROIT Electric Appliance Co., 264-68 Jefferson Ave., Detroit, Mich. "Deaco."

DYNETO Electric Co., Syracuse, N. Y. (See page 377.)

ECK Dynamo & Motor Co., Belleville, N. J.

ECONOMY Electric Co., Economy, Pa. "Perfection."

ELECTRIC Auto-Lite Co., Toledo, O. "Auto-Liter." (See page 159.)

ELECTRIC Generator & Accumulator Co. of America, 1120 W. 35th St., Chicago, Ill. "Elgenac."

ELECTRICAL Engineering & Storage Battery Co., Hume-Mansure Bldg., Sandy Hook, Conn.

ELGENAC—See Electric Generator & Accumulator Co. of America.

EMERSON Electric Mfg. Co., 2024-32 Washington Ave., St. Louis, Mo.

ESTERLINE Co., 228 E. South St., Indianapolis, Ind.

EUREKA—See Henricks Novelty Co.

Eveready Storage Battery Works of National Carbon Co., 514-24 W. 57th St., New York, N. Y. (See page 419.)

FISHER Electrical Works, 2000 Larned St. W., Detroit, Mich. (See page 347.)

FLANDERS Co., Woodward & Warren Aves., Detroit, Mich. "Uno."

GRAY & Davis, Boston, Mass. (See page 231.)

HENRICKS Novelty Co., 1581 St. Paul St., Indianapolis, Ind. "Eureka."

HOLTZER-CABOT Electric Co., Brookline, Mass.

JACKSON Co., Chas. D. (Motor Mart), Boston, Mass.

KEMCO Electric Mfg. Co., 2229 Ashland Rd., Cleveland, O.

L-N—See Leece-Neville Co.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L-N."

LEONARD Electric Co., Ward, Bronxville, N. Y.

MAGLITE—See Briggs Magneto Co.

MAXIMUM Electrical Co., 264-68 Jefferson Ave., E., Detroit, Mich.

MOTSINGER Device Mfg. Co., Lafayette, Ind. "Auto-Sparker."

NATIONAL Coil Co., Lansing, Mich.

NEW Lite Mfg. Co., Newton, Ia.

NORTH East Electric Co., Rochester, N. Y. (See page 531.)

OTHO Motor Co., 45 Milk St., Boston, Mass.

PERFECTION—See Economy Electric Co.

REMY Electric Co., Anderson, Ind. (See page 253.)

RUSHMORE Dynamo Works, Plainfield, N. J. (See page 433.)

SPLITDORF Electrical Co., Newark, N. J. "Splitdorflite." (See page 277.)

SPLITDORFLITE—See Splitdorf Electrical Co.

UNO—See Flanders Co.

VERLUX Co., Alliance, O.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WELLS Mfg. Co., R. C., Fond du Lac, Wis.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

IGNITION DYNAMOS

(See Magnetos, Ignition)

ECONOMIZERS

FUEL ECONOMIZERS

(See Mixers or Agitators, Fuel)

EJECTORS

STEAM EJECTORS

(For filling tanks on steam cars)

PENBERTHY Injector Co., Detroit, Mich.

ELBOWS

PIPE ELBOWS

See Fittings, Pipe)

ELECTROLYTE

STORAGE BATTERY ELECTROLYTE

CONTACT Process Co., Abbott Rd., Buffalo, N. Y.

GRASSELLI Chemical Co., 80 Maiden Lane, New York, N. Y.

KALBFLEISCH Co., Franklin H., Broadway & 16th St., New York, N. Y. (See page 245.)

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Electric Auto-Lite

STARTING — LIGHTING — IGNITION

THE Electric Auto-Lite Starting and Lighting System is regular factory equipment on the 1915

Overland Cars
Willys-Knight Cars
Chevrolet Cars
Abbott Cars
Jackson Cars
Allen Cars
Monarch Cars
Alter Cars

The Electric Auto-Lite Company

Home Office and Factory, Toledo, Ohio

New York Detroit Kansas City San Francisco

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ENAMELS

AUTOMOBILE ENAMELS

(See Paints, Enamel)

BRASS ENAMELS, LACQUERS AND FINISHES

(For blackening lamps, radiators and other brass work on car—See also Paints, Enamel; also Lacquers, Metal)

ARGENAMEL Chemical Co., Smead & Bancroft Sts., Toledo, O.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 129.)

ARSENAL Varnish Co., Rock Island, Ill.

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Metal-Lac," "Blac-Namel."
(See page 131.)

BLAC-NAMEL—See Atlas Auto Supply Co.

BRADLEY & Vrooman Co., Chicago, Ill. "C. Q. P."

BRASS-KOTE—See Northwestern Chemical Co.

C. Q. P.—See Bradley & Vrooman Co.

COLUMBUS Varnish Co., Columbus, O. "Peerless."
(See page 281.)

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

GUN Metal Finish Co., Main & Water Sts., Decatur, Ill.

HALL-THOMPSON Co., Hartford, Conn. "Jet-Lac."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

JET-LAC—See Hall-Thompson Co.

LEATH-R-NU—See Nu-Back Mfg. Co.

METAL-LAC—See Atlas Auto Supply Co.

NATIONAL Cement & Rubber Co., 300-16 S. St. Clair St., Toledo, O.

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill.
(See page 131.)

NORTHWESTERN Chemical Co., Marietta, O. "Brass-Kote."
(See page 129.)

NU-BACK Mfg. Co., 114 N. Commercial St., St. Louis, Mo. "Leath-R-Nu."

PEERLESS—See Columbus Varnish Co.

RIE-NIE—See Durkee-Atwood Co.

RODRIGUEZ, R. E., 56-58 Warren St., New York, N. Y.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y.

SCHMOEGER, Frederic A., Sterling, Ill. "Stay-Shiny."

SLIKUP—See Arnold, N. B.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "3 Star."

STAY-BRIGHT Lacquer Co., 58 W. Washington St., Chicago, Ill.

STAY-SHINY—See Schmoeger, Frederic A.

3-STAR—See Sonneborn Sons.

WADSWORTH, Howland & Co., 84 Washington St., Boston, Mass.

WHIZ—See Hollingshead Co.

ENGINES

GASOLINE ENGINES

(See Motors, Gasoline)

KEROSENE ENGINES

(See Motors, Kerosene)

STEAM AUTOMOBILE ENGINES

DIETER Steam Engine Co., 123 Liberty St., New York, N. Y.

OFELDT & Sons, F. W., Nyack, N. Y.

EXTINGUISHERS

AUTOMOBILE FIRE EXTINGUISHERS

(For Car Equipment)

DURKEE & Co., Chas. D., 2-3 South St., New York, N. Y. "Reliable."

ELECTRENE Co., 17 Battery Pl., New York, N. Y.

INST Lighter Co., 59 E. Main St., Columbus, O.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y.

LA MAY Mfg. Co., 80 N. Water St., Rochester, N. Y.

PYRENE Mfg. Co., 1358 Broadway, New York, N. Y.
(See page 161.)

RELIABLE—See Durkee & Co.

EYES

SCREW EYES

(See Screw Eyes)

FANS

RADIATOR FANS

(See also Radiators)

A-Z Co., 530 W. 56th St., New York, N. Y.

BRISCOE Mfg. Co., Detroit, Mich.

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

HARDY Mfg. Co., Pendleton, Ind.
(See page 163.)

HOTZ Foundry & Mfg. Co., Fremont, O.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O.

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PYRENE REDUCES FIRE INSURANCE COST

Pyrene
TRADE MARK

FIRE EXTINGUISHER

PAYS PART OF YOUR

Automobile Fire Insurance Premium

15 per cent Reduction in Premiums is now Allowed if Car is Equipped with a

PYRENE FIRE EXTINGUISHER

NOTICE.—The extinguisher should be properly affixed (vertically) inside of the dashboard, or on the inside of the front doors, or to the front of the front seat, and held in an accessible position by means of a Pyrene Vehicle Bracket.

Pyrene Vehicle Bracket

PRICES

Steel, Finished in Black Blue and Red Enamel or Galvanized - $0.50

Brass, Lacquered .75

Brass, Nickeled - 1.00

Pyrene Fire Extinguisher

Complete in Bracket

PRICES

Brass Extinguisher with Enameled Bracket $7.50

Brass Extinguisher with Brass Bracket - $7.75

Nickel - Plated Extinguisher with Nickel-Plated Bracket $9.00

Length of Extinguisher, 14 inches; diameter 3 inches; weight (filled) 6 bs.

Pyrene Manufacturing Co.

1358 Broadway New York

Brass and Nickel-plated Pyrene Fire Extinguishers are Included in the lists of Approved Fire Appliances issued by the National Board of Fire Underwriters, examined and labeled under the direction of the Underwriters' Laboratories.

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Alton	Bridgeport	Cincinnati	Fargo, N. D.	New Orleans	St. Louis
Anderson, S. C.	Buffalo	Cleveland	Jacksonville	Oklahoma City	St. Paul
Atlanta	Butte	Dayton	Louisville	Philadelphia	Salt Lake City
Baltimore	Charlotte, N. C.	Denver	Memphis	Phoenix	San Antonio
Birmingham	Charleston, W. Va.	Detroit	Milwaukee	Pittsburg	York, Neb.

PACIFIC COAST DISTRIBUTORS: GORHAM FIRE APPARATUS CO., San Francisco, Los Angeles, Seattle.
Distributors for Canada: May-Oatway Fire Alarms, Ltd., Winnipeg, Toronto.
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FANS (Continued)

RADIATOR FANS (Continued)

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

McCORD Mfg. Co., Detroit, Mich. (See pages 176 and 177.)

O-C—See Oakes Co.

OAKES Co., Indianapolis, Ind. "O-C." (See page 163.)

SPARKS-WITHINGTON Co., Jackson, Mich.

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

FASTENERS

CURTAIN FASTENERS

ANDERSON Electric Machine Tool Co., 1113 Cass Ave., St. Louis, Mo.

BOSTON Fastener Co., 641-43 Atlantic Ave., Boston, Mass.

BREWSTER—See Cowles & Co.

BROGA Automatic Fastener Co., Syracuse, N. Y.

CARR Fastener Co., 31 Ames St., Cambridge, Mass.

COWLES & Co., C., New Haven, Conn. "Brewster," "Excelsior," "Ideal," "Perfect," "Success." (See page 463.)

CRANDAL, Stone & Co., Binghamton, N. Y. "Pioneer," "Premier." (See page 365.)

DESOCO—See Detroit Socket Co.

DETROIT Auto Top Fastener Co., Beaubien & Fort Sts., Detroit, Mich. "Turtle."

DETROIT Socket Co., 314 Jefferson Ave., W., Detroit, Mich. "Desoco."

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

EXCELSIOR—See Cowles & Co.

HIGGIN Mfg. Co., Newport, Ky.

IDEAL—See Cowles & Co.

JONAH & George, Merrimac, Mass.

LEADER—See Neider Co.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass.

NEIDER Co., F. A., Augusta, Ky. "Peerless," "Leader."

NOVELTY Mfg. Co., Waterbury, Conn.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 163.)

PEERLESS—See Neider Co.

PERFECT—See Cowles & Co.

PIONEER—See Crandal, Stone & Co.

PREMIER—See Crandal, Stone & Co.

ROEHM & Davison, Woodbridge & Wayne Sts., Detroit, Mich.

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich. (See page 203.)

STRONG Co., M. H., 168 South Ave., Rochester, N. Y.

SUCCESS—See Cowles & Co.

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

TURTLE—See Detroit Auto Top Fastener Co.

UNITED States Fastener Co., 95 Milk St., Boston, Mass. (See page 163.)

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

HOOD FASTENERS

A-Z Co., 530 W. 56th St., New York, N. Y.

BURNS & Bassick Co., Bridgeport, Conn. (See page 275.)

BUSH Mfg. Co., Hartford, Conn. (See page 363.)

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

EVERTIGHT—See Garage Equipment Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco," "Evertight." (See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

IMPERIAL Brass Mfg .Co., 1200 W. Harrison St., Chicago, Ill. (See page 329.)

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O.

MEDINA Stamping & Machine Co., Medina, N. Y.

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 327.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

FENDERS

AUTOMOBILE FENDERS

AUTOMOBILE Fender Equipment Co., Boyce Bldg., Chicago, Ill.

MUD FENDERS

(See Guards, Mud)

FIBRE

HARD FIBRE

(Sheet, Rod and Tube)

AMERICAN Vulcanized Fibre Co., 500 Equitable Bldg., Wilmington, Del. (See page 165.)

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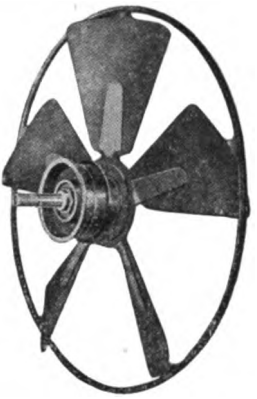
FANS

The Hardy Radiator Fan

is a fan of high quality
and efficiency.
Our special attention is
given to the design and
manufacturing of radiator
fans of the very highest
efficiency and quality at a
very low cost.
Send us your blue print
or size of motor and let
us prove to you our price
and goods are right.

Hardy Manufacturing Company

Pendleton Indiana, U. S. A.



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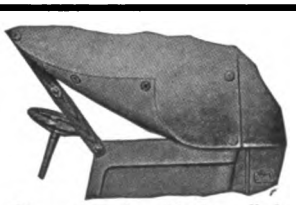

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740 Broadway
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Of Every Size and Style. Used on all the Leading Cars. Prompt Deliveries in any Quantity. Write for Prices.

United States Fastener Company

Manufacturers of Snap Fasteners and Metal Goods

95 Milk Street, Boston, Mass.

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FIBRE (Continued)

HARD FIBRE (Continued)

CONCRETE Fibre Co., Ford & Lafayette Sts., Norristown, Pa.

CONTINENTAL Fibre Co., Newark, Del. **(See page 127.)**

DELAWARE Hard Fibre Co., Wilmington, Del.

DIAMOND State Fibre Co., Elsmere, Del. **(See page 165.)**

EASTERN Hard Fibre Co., 50 Church St., New York, N. Y. **(See page 165.)**

EMPIRE Mfg. Co., 26th & Tatnall Sts., Wilmington, Del.

KEYSTONE Fibre Co., 14th & Crosby Sts., Chester, Pa.

NATIONAL Fibre & Insulation Co., Wilmington, Del.

SPAULDING & Sons Co., J., Wheeler St., Tonawanda, N. Y.

STANDARD Fibre Co., Miller St., Somerville, Mass.

WILMINGTON Fibre Specialty Co., Wilmington, Del. **(See page 279.)**

FILLERS

PAINT FILLERS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

BERRY Bros., Detroit, Mich. "Lionoil."

BRADLEY & Vrooman Co., Chicago, Ill. "C. Q. P."

BRIDGEPORT Wood Finishing Co., New Milford, Conn. "Wheelers."

C. Q. P.—See Bradley & Vrooman Co.

CAPITOL CITY—See Indianapolis Paint & Color Co.

CELOX—See Valentine & Co.

CHASE, Roberts & Co., Fifth St. & West Ave., Long Island City, N. Y.

CHICAGO Varnish Co., 2100 Elston Ave., Chicago, Ill. "Chi-Var-Co."

CHI-VAR-CO.—See Chicago Varnish Co.

CINCINNATI Color Co., Eighth & Evans Sts., Cincinnati, O.

DITZLER Color Co., 18 W. Baltimore Ave., Detroit, Mich.

FLINT Varnish Works, Flint, Mich.

FLOOD & Conklin Co., 136 Chestnut St., Newark, N. J.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

GRAVES Co., N. Z., 22-26 S. Third St., Philadelphia, Pa.

HARDY Paint & Varnish Co., Toledo, O.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

INDIANAPOLIS Paint & Color Co., 118 W. Chesapeake St., Indianapolis, Ind. "Capitol City."

JOHNSTON Paint Co., R. F., Cincinnati, O. "Krakno." **(See page 165.)**

KEYSTONE Paint & Filler Co., Muncy, Pa.

KRAKNO—See Johnston Paint Co.

LIONOIL—See Berry Bros.

MASURY & Son, John W., New York, N. Y.

MOLLER & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.

MOSER Co., Chas., Cincinnati, O.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

NELSON Color Co., Amesbury, Mass.

NICE, Eugene E., 272 S. Second St., Philadelphia, Pa.

PHOENIX Paint & Varnish Co., 124 Market St., Philadelphia, Pa.

RENO Bros. Paint Co., Pulaski, Pa.

ST. LOUIS Surfacer & Paint Co., Arlington Ave. & Terminal Belt Line, St. Louis, Mo.

SCHRACK & Co., 152 N. Fourth St., Philadelphia, Pa.

SMITH & Co., Edward, Sixth St. & West Ave., Long Island City, N. Y.

VALENTINE & Co., 456 Fourth Ave., New York, N. Y. "Celox."

VESTAL Paint Co., Vestal, N. Y.

WHEELERS—See Bridgeport Wood Finishing Co.

WILHELM Co., A., Third & Bern Sts., Reading, Pa.

FINS

RADIATOR FINS

(See Discs, Radiator)

FITTINGS

CURTAIN OPENING FITTINGS

DAYTON Top Improvement Co., Steely Bldg., Dayton, O.

ERVIEN, Horace, Ogontz, Pa.

KELLY & Towers, 1618 Walnut Ave., Cleveland, O. "Towers."

TOWERS—See Kelly & Towers.

PIPE FITTINGS

(For Tubing or Brazing Fittings—See Tubing Unions)

BARD Union Co., Norwich, Conn.

BARRETT Mfg. Co., James, 50 Pearl St., Boston, Mass.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CRANE Co., 836 S. Michigan Ave., Chicago, Ill.

DALTON-INGERSOLL Mfg. Co., 171-75 High St., Boston, Mass.

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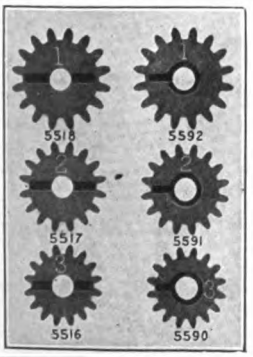

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for Stewart & Clark and Jones Speedometer

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FITTINGS (Continued)

PIPE FITTINGS (Continued)

GRIP Coupling Co., Ware, Mass.

HAMLIN & Emery Brass Co., 49 Island St., Boston, Mass.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

JARECKI Mfg. Co., Erie, Pa.

KELLY & Jones Co., Greensburg, Pa.

KINSEY & Mahler Co., 400 S. Adams St., Peoria, Ill.

LAVIGNE Mfg. Co., 625-41 Commonwealth Ave., Detroit, Mich.

LUNKENHEIMER Co., 228 E. Eighth Ave., Cincinnati, O.

McDONALD Mfg. Co., A. Y., Dubuque, Ia.

McNAB & Harlin Mfg. Co., 55 John St., New York, N. Y.

McRAE & Roberts Co., 221-35 Campbell Ave., Detroit, Mich.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

PITTSBURG Valve & Fittings Co., Barberton, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

POWHATAN Brass & Iron Works, Ranson, W. Va.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis. "Union Cinch."

RUNDLE-SPENCE Mfg. Co., 67 Second St., Milwaukee, Wis.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich.

STODDARD Union Co., Lockport, N. Y.

UNION CINCH—See Richardson-Phenix Co.

WALWORTH Mfg. Co., Boston, Mass.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

TOP FITTINGS AND FIXTURES

(See also Bows, Top; also Fasteners, Curtain; also Irons, Slat; also Irons, Top; also Rests, Bow; also Separators, Bow; also Sockets, Bow; also Straps, Top)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

BLAKESLEE Forging Co., Plantsville, Conn.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORTLAND Carriage Goods Co., 115 Pt. Watson St., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y.

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 365.)

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 205.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

HIGGIN Mfg. Co., Newport, Ky.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MONARCH Carriage Goods Co., 2838-44 Spring Grove Ave., Cincinnati, O.

NEWTON & Son, W. H., 127 Elm St., Cortland, N. Y.

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

FLAGS

FLAGS, PENNANTS AND EMBLEMS

AMERICAN Pennant Co., 69-71 Greene St., New York, N. Y.

CHICAGO Pennant Co., 1224 E. 63d St., Chicago, Ill.

KOSMOS-ART Co., 120 E. Sixth St., Cincinnati, O.

LUXEMOOR Co., 110 E. 13th St., New York, N. Y.

MASSARI Co., H. W., 29 E. Madison St., Chicago, Ill.

ORCUTT & Co., J. C., 134 S. 13th St., Lincoln, Neb.

SPIEGEL Art Co., 111 Broadway, Brooklyn, N. Y.

FLANGES

PRESSED STEEL HUB FLANGES

(For Forged or Cast Flanges—See Forgings; also Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 217.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CROSBY Co., Buffalo, N. Y.
(See page 539.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 219.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

FEDERAL Pressed Steel Co., Milwaukee, Wis.
(See page 291.)

GIER & Dall Mfg. Co., Lansing, Mich.

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GEARS—

Blanks of the finest quality cut to the truest size have gained for our Gears a national reputation among car builders.

We are prepared to furnish Gears in any quantity desired of absolutely uniform quality and to make bevel ring Gears and Pinions with curved teeth, if desired.

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FLANGES (Continued)

PRESSED STEEL HUB FLANGES (Continued)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. **(See page 81.)**

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KELSEY Wheel Co., Detroit, Mich.

KONIGSLOW Mfg. Co., Otto, E. 35th St., & Perkins Ave., Cleveland, O.

WORCESTER Pressed Steel Co., Worcester, Mass. **(See page 157.)**

FLOATS

CORK CARBURETER FLOATS

ARMSTRONG Cork Co., 23d St. & Railroad Ave., Pittsburg, Pa.

DIAMOND Cork Co., 59 Pearl St., New York, N. Y.

MUNDET & Son, L., King, Ferris & Sullivan Sts., Brooklyn, N. Y.

PADDOCK Cork Co., 1209-17 DeKalb Ave., Brooklyn, N. Y.

SPANISH-AMERICAN Cork Co., 2211 Pennsylvania Ave., Baltimore, Md.

METAL CARBURETER FLOATS

FITZGERALD Mfg. Co., Torrington, Conn. **(See page 213.)**

GOODNOW & Blake Mfg. Co., Fourth & Porter Sts., Detroit, Mich.

GOODWIN & Kintz Co., Winsted, Conn.

HERCULES Float Works, 200-10 Franklin St., Springfield, Mass.

IMPERIAL Brass Mfg. Co, 1200 W. Harrison St., Chicago, Ill. **(See page 329.)**

NAUGATUCK Mfg. Co., Naugatuck, Conn.

WORCESTER Pressed Steel Co., Worcester, Mass. **(See page 157.)**

FORGINGS

DROP FORGINGS

ANDERSON Forge & Machine Co., Detroit, Mich. **(See page 169.)**

ATLAS Drop Forge Co., Lansing, Mich. **(See page 463.)**

ATWATER Mfg. Co., Southington, Conn.

BALDWIN Steel Co., Charleston, W. Va.

BARNETT Drop Forging Co., East Hampton, Mass. **(See page 173.)**

BELDEN Machine Co., Whalley Ave. & Tryon St., New Haven, Conn.

BETHLEHEM Steel Co., Third & Poplar Sts., South Bethlehem, Pa.

BILLINGS & Spencer Co., Hartford, Conn.

BLAKESLEE Forging Co., Plantsville, Conn

BUFFALO Drop Forge Co., 53-59 Carroll St., Buffalo, N. Y.

CANTON Drop Forging & Mfg. Co., Canton, O. **(See page 417.)**

CAPE Ann Tool Co., Granite St., Pigeon Cove, Mass.

CHAMPION Machine & Forging Co., 3725 E. 78th St., Cleveland, O. **(See page 137.)**

CHICAGO Drop Forge & Foundry Co., 447-517 Kensington Ave., Chicago, Ill.

CHRISTIE-KLINE Forge Co., 60 St. Aubin Ave., Detroit, Mich.

CLAPP Mfg. Co., E. D., Auburn, N. Y.

CLEVELAND Hardware Co., Cleveland, O.

COLUMBIAN Hardware Co., 1296 E. 53d St., Cleveland, O.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

COLUMBUS Forge & Iron Co., Columbus, O.

CONSOLIDATED Mfg. Co., Toledo, O.

CORTLAND Forging Co., Cortland, N. Y.

CRESCENT Forgings Co., Oakmont, Pa.

DEAN Forging Co., 1825 E. Jackson St., Muncie, Ind.

DETROIT Forging Co., 120 Mt. Elliott St., Detroit, Mich.

DETROIT Steel Products Co., 2274 E. Grand Boulevard, Detroit, Mich. **(See page 445.)**

DIAMOND Forging & Mfg. Co., Pittsburg, Pa

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. **(See page 527.)**

DROP Forging Co. of New York, West Side Ave. & Fisk St., Jersey City, N. J.

ECCLES Co., Richard, Auburn, N. Y. **(See page 463.)**

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.)

ELMORE Tool Mfg. Co., Hartford, Conn.

EMERGENCY Forge Co., Lansing, Mich.

EUREKA Co., North East, Pa. **(See page 255.)**

FOREST City Electric Co., 5003 Windsor Ave., Cleveland, O. **(See page 371.)**

FRASSE & Co., Peter A., New York, N. Y. (Importers.) **(See page 219.)**

FROST Gear & Forge Co., Jackson, Mich. **(See page 167.)**

FRUIN Drop Forge Co., 347 Root St., Chicago, Ill.

FULTON Machine & Forging Co., Canal Fulton, O.

GENERAL Drop Forge Co., Buffalo, N. Y. **(See page 273.)**

GLOBE Malleable Iron & Steel Co., Syracuse, N. Y. **(See page 113.)**

HENRY & Allen, Arelius Ave., Auburn, N. Y.

HERBRAND Co., Fremont, O.

HERCULES Forge Co., S. Senate Ave. & Merrill St., Indianapolis, Ind.

HIGGINS Spring & Axle Co., 1314 16th St., Racine, Wis. **(See page 395.)**

Complete Index to Classification appears on Pages 8 to 26.

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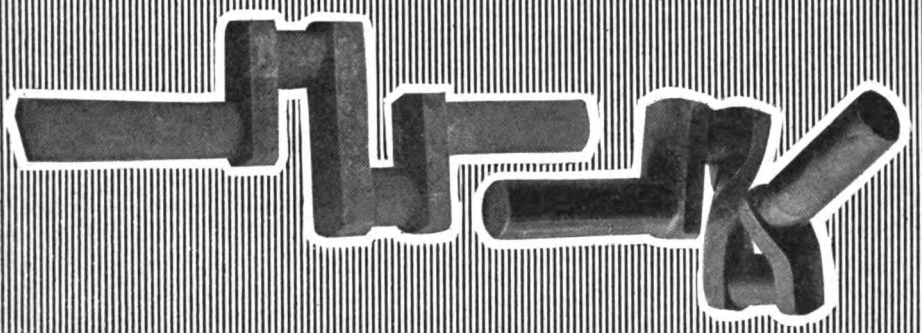
Drop Forgings



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Anderson Forge & Machine Company.

DETROIT, MICHIGAN

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FORGINGS (Continued)

DROP FORGINGS (Continued)

INDIANAPOLIS Drop Forging Co., Madison Ave. & Dowling St., Indianapolis, Ind.

INGALLS-SHEPARD Forging Co., Michigan Ave. & Van Buren St., Chicago, Ill. (See page 513.)

JACKSON Drop Forging Co., Jackson, Mich.

KILBORN & Bishop Co., Chapel & Lloyd Sts., New Haven, Conn.

KROPP Forge Co., 2508-22 W. 21st St., Chicago, Ill.

KRUPP—See Prosser & Son.

LAKESIDE Forge Co., East Lake Rd., Erie, Pa.

MACHINERY Forging Co., Hamilton & Marquette Sts., Cleveland, O.

MARTIN Forging Co., H. J., 510 Harding St. Indianapolis, Ind.

MERRILL Bros., Maspeth, N. Y.

MICHIGAN Bolt & Nut Works, ft. Meldrun Ave., Detroit, Mich.

MOORE Drop Forging Co., Birnie Ave. Springfield, Mass.

NEW England Forge Co., 9 Plymouth St. Worcester, Mass.

O. K. Tool Holder Co., Shelton, Conn.

OBENBERGER Drop Forge Co., Milwaukee, Wis. (See page 475.)

OHIO Forge Co., Cleveland, O. (See page 463.)

OLIVER Iron & Steel Co., Pittsburg, Pa.

PAGE-STORMS Drop Forge Co., Chicopee, Mass.

PARK Drop Forge Co., Cleveland, O. (See page 145.)

PONTIAC Drop Forge Co., Pontiac, Mich.

PORTLAND Foundry & Machine Co., Portland, Ind.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 381.)

QUEEN City Forging Co., Cincinnati, O.

RACINE Drop Forge Co., Racine, Wis.

REVERE Drop Forge Co., Revere, Mass.

RICHMOND Forging Corp. (Acca Station), Richmond, Va.

RIVETLESS Chain & Engineering Co., Avon, Pa.

ROREN Drop Forging Co., 37 Warren St., New York, N. Y.

SEWARD & Son Co., M., Grant St., New Haven, Conn.

SMITH Co., A. O., Milwaukee, Wis. (See page 373.)

SMITH & Co., H. D., Plantville, Conn.

SPICER Mfg. Co., Plainfield, N. J. (See page 225.)

STANDARD Welding Co., Cleveland, O. (See Book Mark.)

STRIEBY & Foote Co., 301 Ogden St., Newark, N. J.

SUNDBERG Co., Kinzie & Carpenter Sts., Chicago, Ill.

TRANSUE & Williams Co., W. Ely St., Alliance, O.

UNION Drop Forge Co., 358 W. Indiana St., Chicago, Ill.

UNION Forging Co., Union, N. Y. (See page 473.)

WAVERLY Co., 139 S. East St., Indianapolis, Ind.

WESTERN Drop Forge Co., Marion, Ind. (See page 525.)

WESTERN Malleable Steel Co., 1250 Jefferson Ave., W., Detroit, Mich.

WESTERN Tool & Forge Co., Brackenridge, Pa.

WHITMAN & Barnes Mfg. Co., Akron, O.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WILCOX Mfg. Co., D., Mechanicsburg, Pa.

WILLIAMS & Co., J. H., 150 Hamilton Ave., Brooklyn, N. Y.

WRIGHT Wrench & Forging Co., 1424 Barth Ct., Canton, O.

WYMAN & Gordon Co., Worcester, Mass. (See Back Bone.)

FRAMES

PRESSED STEEL FRAMES

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich. "Presteel." (See page 219.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 527.)

FORSYTH Bros. Co., Harvey, Ill.

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O. (See page 157.)

KINSEY Mfg. Co., Toledo, O.

PARISH Mfg. Co., Reading, Pa. (See page 483.)

PARISH & Bingham Co., Cleveland, O. (See page 171.)

PRESTEEL—See Detroit Pressed Steel Co.

SMITH Co., A. O., Milwaukee, Wis. (See page 373.)

FRICTIONS

FIBRE FRICTIONS

(For use in Friction Transmission)

DIVINE Bros. Co., 202 Whitesboro St., Utica, N. Y.

ROCKWOOD Mfg. Co., 1800 English Ave., Indianapolis, Ind.

GALVANIZING

GALVANIZING, SHERARDIZING AND RUST-PROOFING

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

BONTEMPI Rust-Proofing Co., 949 Broadway, New York, N. Y.

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GALVANIZING (Continued)

GALVANIZING, SHERARDIZING AND RUST-PROOFING (Continued)

BRIDGEPORT Electro Plate Co., 270 Kossuth St., Bridgeport, Conn.

BUFFALO Galvanizing & Tinning Works, 49-53 Jackson St., Buffalo, N. Y.

CLEVELAND Galvanizing Works Co., Cooper Ave. & P. R. R., Cleveland, O.

CRAMP & Sons Ship & Engine Bldg. Co., William, Philadelphia, Pa.
(See page 257.)

DANA Mfg. Co., Cincinnati, O.

DOVER Stamping & Mfg. Co., Cambridge, Mass.
(See page 97.)

GEUDER, Paeschke & Frey Co., 100 15th St., Milwaukee, Wis.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

GRABLER Mfg. Co., Cleveland, O.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 477.)

MEAKER Co., Fulton & Elizabeth Sts., Chicago, Ill.

METAL Treating & Equipment Co., 834 Humboldt St., Brooklyn, N. Y.

NATIONAL Galvanizing Co., 1918-26 Carroll Ave., Chicago, Ill.

NEW England Sherardizing Co., Hartford, Conn.

NEW Haven Sherardizing Co., State & Lawrence Sts., New Haven, Conn.

NEWARK Stamping Co., Newark, O.
(See page 551.)

OHIO Sherardizing Co., Whitney Power Blk., Cleveland, O.

R. I. Welding & Sherardizing Co., Promenade & Park Sts., Providence, R. I.

SCOTT, C. U., head of Wall St., Davenport, Ia.

SHERARDIZING Co. of Illinois, 567 W. Van Buren St., Chicago, Ill.

STANLEY Works, New Britain, Conn.

UNION Elevator & Machine Co., 215-17 W Ontario St., Chicago, Ill.

U. S. Electro-Galvanizing Co., 1-9 Park Ave., Brooklyn, N. Y.

VAIL Galvanizing Plant, 209-11 Commercial St., Boston, Mass.

VOGEL & Bros., Wm., Brooklyn, N. Y.

GAPS

SPARK GAPS

ACME—See Sheer Co.

B. & M. Mfg. Co., 538 Muskego Ave., Milwaukee, Wis.

BREMER & Mooney Mfg. Co., 538 Muskego St., Milwaukee, Wis.

CHAMPION Spark Plug Co., Toledo, O. "Misskip."
(See pages 293, 294, 295 and 296.)

CUT-OUT Switch Co., Broadway & 195th St., New York, N. Y.

DALITZ Mfg. Co., 3134 Payne Ave., Cleveland, O.

DOXEY & Doxey, 2132 S. Michigan Ave., Chicago, Ill.

HEMMETER Spark Gap Mfg. Co., Dime Bank Bldg., Detroit, Mich.

HERZ & Co., 245 W. 55th St., New York, N. Y. "Oscillum."
(See page 303.)

MANVILLE, Geo. W., Bridge St., Towanda, Pa.

MEANS, Eugene D., Towanda, Pa.

MISSKIP—See Champion Spark Plug Co.

MOSLER & Co., A. R., Mt. Vernon, N. Y.
(See page 299.)

NOTAMISS Spark Gap Co., Hippee Bldg., Des Moines, Ia.

OSCILLUM—See Herz & Co.

SHEER Co., H. M., Quincy, Ill. "Acme."

SMITH & Gunn, 22-26 E. Broad St., Burlington, N. J.

T. A. D.—See Toledo Auto Devices Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

X-RAY Spark Indicator Co., Pleasant Lake, Ind.

GARAGES

PORTABLE GARAGE BUILDINGS

ALADDIN—See North American Construction Co.

AMERICAN Portable House Co., Arcade Bldg., Seattle, Wash.

ANCHOR Corrugating Construction Co., 62 Cortlandt St., New York, N. Y.

BELMONT-STEWART Iron Works, 6 Beacon St., Boston, Mass.

BURNHAM-STANDEFORD Co., Washington & First Sts., Oakland, Cal.

CATHERMAN, J. A., Beaver Springs, Pa.

CHESBRO-WHITMAN Co., 1167 First Ave., New York, N. Y.

CORNELL—See Wyckoff Lumber & Mfg. Co.

CRAIG, David, 70 Broad St., Boston, Mass.

DUCKER Co., 277 Broadway, New York, N. Y.

DULUTH Corrugating & Roofing Co., Duluth, Minn.

EDWARDS Mfg. Co., 724-74 Eggleston Ave., Cincinnati, O. "Steelcote."

FARGO Cornice & Ornament Co., 1002-04 Front St. Fargo, N. Dak. "Rusk."

GORDON Mfg. Co., Middletown, O.

HARRY Steel Co., O. K., 2333-35 Papin St., St. Louis, Mo.

HODGSON Co., E. F., 116 Washington St., Boston, Mass.

IDEAL Sectional Building Co., St. Johns, Mich.

ILLINOIS Portable House Co., 6331-33 Evanston Ave., Chicago, Ill.

KARR Portable House Co., 2554 W. Irving Park Blvd., Chicago, Ill.

KENYON Co., R. L., Waukesha, Wis.

MERSHON & Morley Co., Saginaw, Mich.

METAL Shelter Co., 17 Battery Pl., New York, N. Y. "Pruden."

NILES Iron & Steel Roofing Co., Niles, O.

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of every description

It takes elaborate and expensive facilities for turning out Drop Forgings promptly, accurately and economically. We are prepared to produce anything you may need and almost as quickly as you might desire it.

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BARNETT DROP FORGING COMPANY

Easthampton, Mass.

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GARAGES (Continued)

PORTABLE GARAGE BUILDINGS (Continued)

NORTH American Construction Co., Bay City, Mich. "Aladdin."

PINYOUN & Son, F. C., 2526 Carnegie Ave., Cleveland, O.

PRUDEN—See Metal Shelter Co.

PRUDEN Co., C. D., Warner, Dock & Bayard Sts., Baltimore, Md. "Prudential."

PRUDENTIAL—See Pruden Co.

RIVERSIDE Mfg. Co., 162-66 Riverside Ave., Newark, N. J.

ROGERS Co., J. S., Moorestown, N. J.

RUBY Mfg. Co., Jackson & Douglass Sts., Jackson, Mich.

RUSK—See Fargo Cornice & Ornament Co.

SECTIONAL Steel Garage Co., 985 Dix Ave., Detroit, Mich.
(See page 505.)

STEEL Portable Building Co., Chicago, Ill.

STEELCOTE—See Edwards Mfg. Co.

TAYLOR Mfg. Co., 219 Glenridge Ave., Montclair, N. J.

WYCKOFF Lumber & Mfg. Co., Ithaca, N. Y. "Cornell."

ZETTERMAN Machinery Co., 6 Beacon St., Boston, Mass.

GASKETS

METALLIC GASKETS

(For Asbestos, Composition or Rubber Gaskets—See Packing)

AKRON Metallic Gasket Co., 151 N. Union St., Akron, O.

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

FITZGERALD Mfg. Co., Torrington, Conn. "Never-Leak."
(See page 213.)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa. "Right."

GASTITE—See Goodwin & Kintz Co.

GOODWIN & Kintz Co., Winsted, Conn. "Gastite."

HERZ & Co., 245 W. 55th St., New York, N. Y. (Importers.)
(See page 303.)

KINSEY Mfg. Co., Toledo, O. "Kinwood."

KINWOOD—See Kinsey Mfg. Co.

McCORD Mfg. Co., Detroit, Mich. "McKim."
(See pages 176 and 177.)

McKIM—See McCord Mfg. Co.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

NEVER-LEAK—See Fitzgerald Mfg. Co.

PHOENIX Specialty Mfg. Co., 48-50 Duane St., New York, N. Y.

RIGHT—See Gasket Supply Co.

UNITED States Indestructible Gasket Co., 50 Church St., New York, N. Y.

VICTOR Mfg. & Gasket Co., Troy & 21st Sts., Chicago, Ill.

GASOLINE

AUTOMOBILE GASOLINE

BUCK & Co., E. A., Worcester, Mass. "Powers."

CREW Levick Co., Land Title Bldg., Philadelphia, Pa.

EMCO—See Emery Mfg. Co.

EMERY Mfg. Co., Bradford, Pa. "Emco."

ENERGINE Refining & Mfg. Co., The Arcade, Cleveland, O.

GULF Refining Co., Frick Bldg. Annex, Pittsburg, Pa.

NATIONAL Refining Co., Rose Bldg., Cleveland, O. "White Rose."

PETROLEUM Products Co., 3600-10 Grant Blvd., Pittsburg, Pa. "Vigorite."

POWERS—See Buck & Co.

PURE Oil Co., Fifth & Chestnut Sts., Philadelphia, Pa.

STANDARD Oil Co. of N. Y., New York, N. Y.

TEXACO—See Texas Co.

TEXAS Co., 17 Battery Pl., New York, N. Y. "Texaco."

TIONA Refining Co., Madison Ave., & Belt Ry., Indianapolis, Ind.

ULLER, C. C., Tidioute, Pa.

VIGORITE—See Petroleum Products Co.

WAVERLY Oil Works Co., 54th St. & A. V. R. R., Pittsburg, Pa.

WHITE ROSE—See National Refining Co.

GATES

AUTOMATIC DRIVEWAY GATES

BYERLY—See Cargill Mfg. Co.

CARGILL Mfg. Co., West End of Buttles Ave., Columbus, O. "Byerly."

MANLOVE Gate Co., 17 W. Huron St., Chicago, Ill.

GAUGES

BATTERY GAUGES

(Pocket Battery Testers. For Standard Instruments—See Ammeters)

ADVANCE—See Eldredge Electric Mfg. Co.

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

CLARK Electric Meter Co., 219 S. Clinton St., Chicago, Ill.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

ELCO—See Eldredge Electric Mfg. Co.

ELDREDGE Electric Mfg. Co., 7 Post Office Sq., Springfield, Mass. "Advance," "Elco."

EVER READY—See American Ever Ready Co.

HOYT Electrical Instrument Works, Penacook, N. H. "Triune," "Utimate."
(See page 527.)

LUCAS Electric Devices Co., Western Ave., Chicago, Ill.

Complete Index to Classification appears on Pages 8 to 26.

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"TRIUMPH" GAGE HEAD REMOVED TO SHOW MAGNET

"TRIUMPH" JR. SIDE GAGE

"Triumph"

MAGNETIC GASOLINE TANK GAGES

For ten years manufacturers of high-grade fluid gages for the manufacturers who buy quality products. Samples gladly submitted on receipt of blue prints of your tank.

Part of 1914 Standard Equipment on such cars as—

Pierce-Arrow
Packard
Lancia
Locomobile
Stevens-Duryea
Cadillac
Mercer
Cole
Marmon
Simplex
Moon
and others

Special Models for motor boats, motor cycles, portable and underground storage tanks which preclude any danger of fire or explosion on account of a leaky gage. Fume or liquid leakage is impossible with our instruments even under heavy pressure, as the magnetically-turned indicating hand does away with any direct connection into the tank from the gage head.

ACCESSORY DEALERS.

Write us for information on our special gage for Ford Cars. The best Ford Gage made.

BOSTON AUTO GAGE COMPANY

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Factory and General Office, 8 Waltham Street, Boston, Massachusetts
Western Office, 1231 Woodward Avenue, Detroit, Michigan

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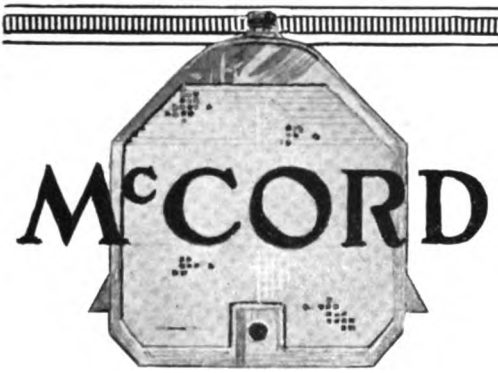

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The Radiator of Quality

There are several reasons for the high reputation of these cellular and tubular type radiators on pleasure cars, trucks and tractors.

McCord Radiators

meet the broad service needs of the automobile radiator and the individual requirements for each class of vehicle.

For the pleasure car we build radiators of beauty and lightness, for the truck we emphasize strength and compactness, while for the tractor we design for extra sturdiness and durability.

The efficiency of McCord Radiators is due to our adherence to an ideal of service. We do not content ourselves with following manufacturer's blue prints, but see to it that the design includes ample cooling surface and strength.

The same habit of thoroughness in design and construction distinguishes the McCord Fan and the McCord Force Feed Lubricators.

McCORD MANUFACT

DETROIT

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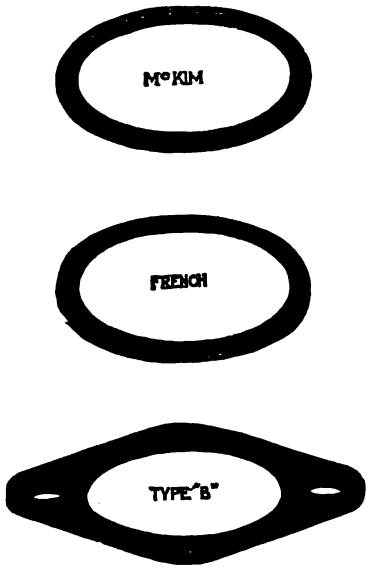
McKIM Copper Asbestos Gaskets



The Original Copper Asbestos Gasket.

One of the "little things" about the car that counts for so much in service.

McKim Gasket

is the standard for all gasolene motor flanges—because it is made in immense quantities from the best materials and by the most improved methods. The method of manufacturing forms a Gasket of long life.

We carry on hand at all times an actual minimum stock of over half a million Gaskets of assorted sizes.

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McCord products are worthy of your consideration. Write us.

URING COMPANY

MICHIGAN

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GAUGES (Continued)

BATTERY GAUGES (Continued)

PENNSYLVANIA Rubber & Supply Co., 1845-47 Euclid Ave., Cleveland, O. "Prsco."

PIGNOLET, Louis M., 78 Cortlandt St., New York, N. Y.

PRSCO—See Pennsylvania Rubber & Supply Co.

READRITE Meter Works, 22 Main St., Bluffton, O.

RELIANCE Instrument Co., 1135 Van Buren St., Chicago, Ill.

ROBERT Instrument Co., 56 Shelby St., Detroit, Mich.

SHOLDER-EXCEL Mfg. Co., Clyde, O.

STERLING Mfg. Co., 321 Frankfort Ave., Cleveland, O.

TRIUNE—See Hoyt Electrical Instrument Works.

TROY Electrical Co., River & State Sts., Troy, N. Y.

ULTIMATE—See Hoyt Electrical Instrument Works.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

BOILER WATER-LINE GAUGES

(For indicating height of water in steam boilers)

ASHTON Valve Co., 271 Franklin St., Boston, Mass.
(See page 499.)

RELIABLE Water Gauge Co., 1616 Pine St., St. Louis, Mo.

SCHAEFFER & Budenberg Mfg. Co., 481 De Kalb Ave., Brooklyn, N. Y.

WILTBONCO Mfg. Co., 10 Post Office Sq., Boston, Mass.

CYLINDER COMPRESSION GAUGES

(For testing compression in gas engine cylinders)

AZADIAN Gauge Mfg. Co., 107 N. Franklin St., Syracuse, N. Y.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

FOXBORO Co., Foxboro, Mass.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

UNITED States Gauge Co., New York, N. Y.
(See page 558.)

GASOLINE TANK GAUGES

(For indicating amount of gasoline in fuel tanks)

AZADIAN Gauge Mfg. Co., 107 N. Franklin St., Syracuse, N. Y.

BOSTON Auto Gage Co., 8 Waltham St., Boston, Mass. "Triumph," "Challenge."
(See page 175.)

BUSH Mfg. Co., Hartford, Conn.
(See page 363.)

CARR Sight & Signal Gauge Co., 694 Woodward Ave., Detroit, Mich.

CHALLENGE—See Boston Auto Gage Co.

DEPENDO—See Roper & Co.

EUREKA Gauge Co., Majestic Bldg., Detroit, Mich.

EVERETT Mfg. Co., 162-64 N. May St., Chicago, Ill.

FREER—See Tanner-Hower Mfg. Co.

GOODNOW Mfg. Co., Old South Bldg., Boston, Mass.

HANS Motor Equipment Co., La Crosse, Wis.

HYDRO-CATOR—See Sterling Gauge Co.

IMPERIAL Fluid Gauge Co., Canton, O.

JOHNSTON, J. E., 133 E. Lancaster Ave., Ardmore, Pa.

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.

LUCAS Electric Devices Co., Western Ave., Chicago, Ill.

MODERN Specialty Co., Racine, Wis.

PALMER Gauge Co., Dwight Bldg., Jackson, Mich.

PFAHL Gauge & Mfg. Co., Akron, O.

RITZ GASOMETER—See Ritz-Woller, Oliver C.

RITZ-WOLLER, Oliver C., 536-38 S. Clark St., Chicago, Ill. "Ritz Gasometer."

ROCHESTER Mfg. Co., 347 Blossom Rd., Rochester, N. Y.

ROPER & Co., C. F., Hopedale, Mass. "Dependo."

RUDELL Gasoline Indicator Co., 1716 Crenshaw Blvd., Los Angeles, Cal.

STERLING Gauge Co., 47 Adelaide St., Detroit, Mich. "Hydro-Cator."

TANNER—See Tanner-Hower Mfg. Co.

TANNER-HOWER Mfg. Co., Akron, O. "Freer," "Tanner."
(See page 491.)

TRIUMPH—See Boston Auto Gage Co.

WEISS Mfg. Co., Torrington, Conn.

STEAM AND AIR GAUGES

(Standard Pressure Gauges)

AMERICAN Steam Gauge & Valve Mfg. Co., 220 Camden St., Boston, Mass.

ASHTON Valve Co., 271 Franklin St., Boston, Mass.
(See page 499.)

AZADIAN Gauge Mfg. Co., 107 N. Franklin St., Syracuse, N. Y.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

CLEVELAND Steam Gauge Co., 418 W. Prospect Ave., Cleveland, O.

FOXBORO Co., Foxboro, Mass.

IMPROVED Gage Mfg. Co., 302 W. Water St., Syracuse, N. Y.

MARSH & Co., Jas. P., 118-24 S. Clinton St., Chicago, Ill.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill

SCHAEFFER & Budenberg Mfg. Co., 481 De Kalb Ave., Brooklyn, N. Y.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

UNITED States Gauge Co., New York, N. Y.
(See page 558.)

UTICA Steam Gauge Co., Frankfort, N. Y.

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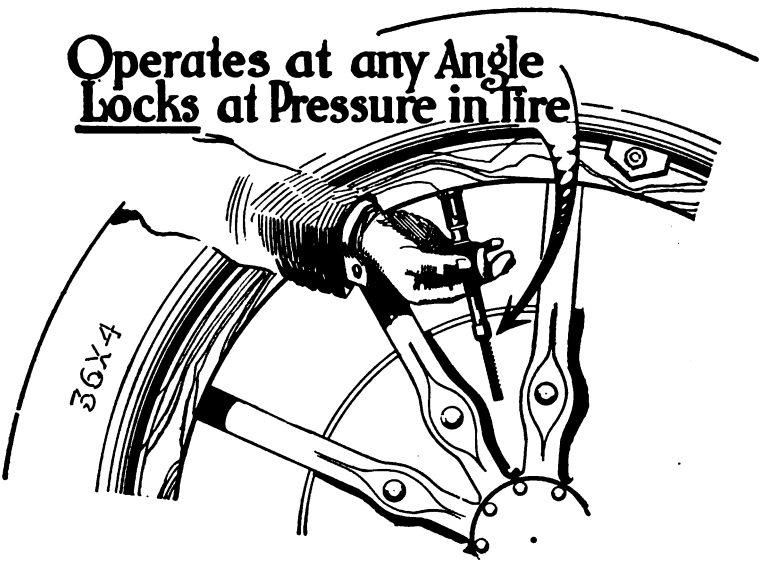
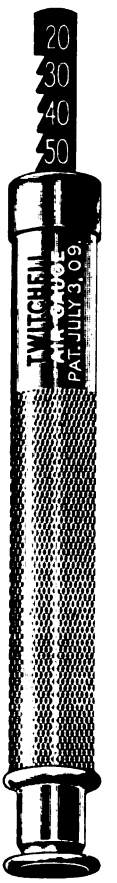
The New Positive Lock Stop Twitchell Air Gauge

The Standard Tire Pressure Gauge for 1914





Tire Insurance for $1.00

THE *new* Twitchell is accurate, simple, durable, easily applied and easily read. It can be used with the tire valve at any angle and positively locks at pressure in tire. Insist upon getting the NEW Twitchell. It possesses a positive lock stop feature that renders absolutely impossible the registration of any but the exact air pressure in your tires. This construction permits the use of the gauge, no matter in what position the tire valve rests. You no longer have to turn the wheel around until the valve is at the bottom. Another improvement to be found in the NEW Twitchell is the lengthened base, which permits of an airtight connection being made with the valve, no matter how small the space between the rim and hub.

The demand for Twitchells last year was in excess of our ability to satisfy it. This year it is even greater. Are you to meet it?

The Twitchell Gauge Company

1208 Michigan Avenue Chicago, Illinois

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GAUGES (Continued)

TIRE PRESSURE GAUGES

(For indicating pressure in tires—See also Valves Tire Safety)

ADVANCE Specialty Co., Shinola Bldg., Rochester, N. Y. "Staon."

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y. "Tyrometer." (See page 207.)

ASHTON Valve Co., 271 Franklin St., Boston, Mass. (See page 499.)

AZADIAN Gauge Mfg. Co., 107 N. Franklin St., Syracuse, N. Y.

BARNARD Specialty Co., 3300 Maple Ave., Los Angeles, Cal.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill. "Reliable."

FOXBORO Co., Foxboro, Mass.

HANS Motor Equipment Co., La Crosse, Wis.

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill. "Pneu-Meter."

IMPROVED Gage Mfg. Co., 302 W. Water St., Syracuse, N. Y.

INVINCIBLE—See United States Gauge Co.

KELLOGG Mfg. Co., Rochester, N. Y. (See page 527.)

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

PNEU-METER—See Hill Pump Valve Co.

RELIABLE—See Edelmann & Co.

SCHRADER'S Son, A., 783-91 Atlantic Ave., Brooklyn, N. Y. (See page 435.)

STAON—See Advance Specialty Co.

STEVENS Mfg. & Supply Co., Fischer Bldg., Chicago, Ill.

TWITCHELL Gauge Co., 1208 Michigan Ave., Chicago, Ill. (See page 179.)

TYROMETER—See Allen Auto Specialty Co.

UNITED States Gauge Co., New York, N. Y. "Invincible." (See page 558.)

WATER CIRCULATION GAUGES

(For indicating pressure in water cooling systems)

ASHTON Valve Co., 271 Franklin St., Boston, Mass. (See page 499.)

AZADIAN Gauge Mfg. Co., 107 N. Franklin St., Syracuse, N. Y.

FOXBORO Co., Foxboro, Mass.

IMPROVED Gage Mfg. Co., 302 W. Water St., Syracuse, N. Y.

SCHAEFFER & Budenberg Mfg. Co., 481 De Kalb Ave., Brooklyn, N. Y.

GAUNTLETS

MOTORISTS GAUNTLETS

(See Gloves, Motorists)

GEARS

CYCLECAR DIFFERENTIAL GEARS

BROWN-LIPE-CHAPIN Gear Co., Syracuse, N. Y. (See page 507.)

DIFFERENTIAL GEARS

BARNES Gear Co., Oswego, N. Y.

BOSTON Gear Works, Norfolk Downs, Mass. (See page 313.)

BROWN-LIPE-CHAPIN Gear Co., Syracuse, N. Y. (See page 507.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

CROSS Gear & Engine Co., Detroit, Mich. (See page 307.)

CULLMAN Wheel Co., 1352 Greenwood Terrace, Chicago, Ill. (See page 181.)

DETROIT Standard Gear Co., 742 Woodbridge St., E., Detroit, Mich.

FROST Gear & Forge Co, Jackson, Mich. (See page 167.)

GEARLESS Differential Co., Penobscot Bldg., Detroit, Mich.

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O. (See page 189.)

LEWIS Differential Co., 222 S. Canal St., Chicago, Ill.

M. & S. Gear Co., 1528 Grand Ave., Kansas City, Mo. "Muehl." (See Inside Back Cover.)

METAL Products Co., Detroit, Mich. (See page 485.)

MUEHL—See M. & S. Gear Co.

MUNCIE Gear Works, Muncie, Ind.

NEW Process Gear Corp., Syracuse, N. Y. (See page 195.)

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind. (See page 183.)

RUSSEL Motor Axle Co., North Detroit, Mich. (See page opposite last page.)

RUSSEL Wheel & Foundry Co., Detroit, Mich

WARNER Gear Co., Muncie, Ind. (See page 239.)

WARNER Mfg. Co., Toledo, O. (See page 405.)

RUNNING GEARS

BORBEIN Auto Co., 2109-11 N. Ninth St., St. Louis, Mo.

DART Motor Truck Co., Ainsborough & Stratford Aves., Waterloo, Ia.

FRANKLIN Machine Co., 770 Franklin Ave. Brooklyn, N. Y.

CYCLECAR STEERING GEARS

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

Complete Index to Classification appears on Pages 8 to 26.

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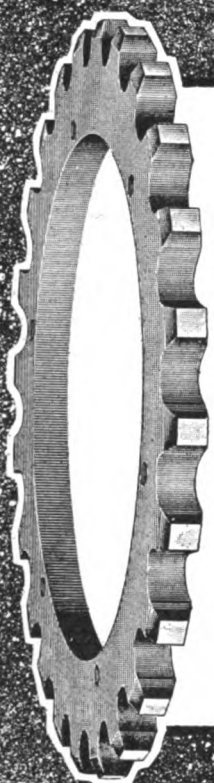
CULLMAN

SPROCKETS and DIFFERENTIALS



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and **Culver-Taylor**
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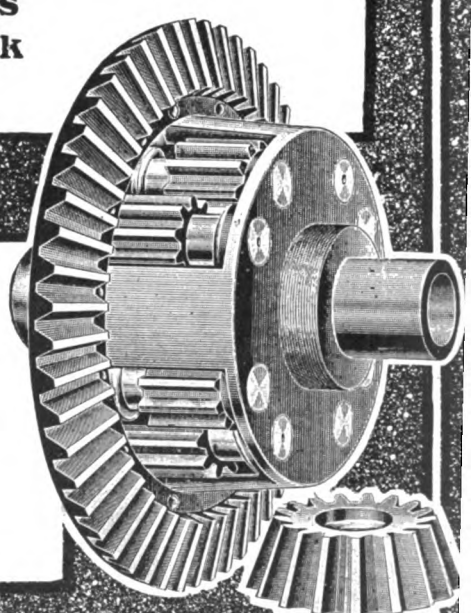

CULLMAN WHEEL CO.,
1352 Greenwood Terrace,
CHICAGO

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GEARS (Continued)

CYCLECAR STEERING GEARS (Continued)

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind.
(See page 183.)

WARNER Gear Co., Muncie, Ind.
(See page 239.)

WARNER Mfg. Co., Toledo, O.
(See page 405.)

STEERING GEARS

BARNES Gear Co., Oswego, N. Y.

BAYARD & Co., M. L., Woodbine, N. J. "Hindley."

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 313.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

CROSS Gear & Engine Co., Detroit, Mich.
(See page 307.)

DITWILER Mfg. Co., Galion, O.

FOSTER Gear Co., Columbus, O.

GEMMER Mfg. Co., Detroit, Mich.
(See page 594.)

GNOETH Steering Gear Co., 638 Sycamore St., Cincinnati, O.

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O.
(See page 189.)

HINDLEY—See Bayard & Co.

JACKSON-CHURCH-WILCOX Co., Saginaw, W. S., Mich. "Jacox."
(See page 443.)

JACOX—See Jackson-Church-Wilcox Co.

LAVIGNE Gear Co., Station A., Racine, Wis.
(See page 313.)

MASCO—See Motor Appliance Sales Co.

MOTOR Appliance Sales Co., 1110 Chamber of Commerce, Detroit, Mich. "Masco."

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind.
(See page 183.)

S. & W.—See Schweppe & Wilt Mfg. Co.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich. "S. & W."

SUPERIOR Machine & Engineering Co., 51-53 Fort St., E., Detroit, Mich.

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

UNIVERSAL Mfg. Co., Racine, Wis.
(See page 243.)

WARNER Co., T. W., Kilgore & Perkins Aves., Muncie, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 239.)

WARNER Mfg. Co., Toledo, O.
(See page 405.)

WILCOX-McKIM Co., Saginaw, Mich.

AUTOMATIC STARTER TRANSMISSION GEARS

(For automatically meshing pinion on starter motor with fly wheel gear)

BENDIX—See Eclipse Machine Co.

ECLIPSE Machine Co., Elmira, N. Y. "Bendix."

CYCLECAR TRANSMISSION GEARS

DE LUXE—See Spacke Machine Co.

DETROIT Gear & Machine Co., Detroit, Mich.
(See page 187.)

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

LEFEVER Arms Co., 1 Maltbie St., Syracuse, N. Y.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind. "De Luxe."
(See page 289.)

WARNER Gear Co., Muncie, Ind.
(See page 239.)

WARNER Mfg. Co., Toledo, O.
(See page 405.)

TRANSMISSION GEARS

AMERICAN Die & Tool Co., Reading, Pa.
(See page 189.)

AUTOPARTS Mfg. Co., Detroit, Mich.

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind.

BALL—See New York Gear Works.

BARNES Gear Co., Oswego, N. Y.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 313.)

BRENNAN Motor Co., 105 Grape St., Syracuse, N. Y.

BROWN-LIPE-CHAPIN Gear Co., Syracuse, N. Y.
(See page 507.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BUDA Co., Harvey, Ill.

CAMPBELL—See Economy Equipping Co.

CLIMAX Electric Works, New Salem, Mass.

COTTA Gear Co., 720-30 Sixth St., Rockford, Ill.

COTTA Transmission Co., 814 S. Main St., Rockford, Ill.
(See page 187.)

COVERT Motor Vehicle Co., Detroit, Mich.
(See page 591.)

CROSS Gear & Engine Co., Detroit, Mich.
(See page 307.)

DART Motor Truck Co., Ainsborough & Stratford Aves., Waterloo, Ia.

DETROIT Gear & Machine Co., Detroit, Mich.
(See page 187.)

DETROIT Standard Gear Co., 742 Wodbridge St., E., Detroit, Mich.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

ECONOMY Equipping Co., Unity Bldg., Chicago, Ill. "Campbell."

FARMER Mfg. Co., Fordyce & Marston Sts., Detroit, Mich.
(See page 311.)

Complete Index to Classification appears on Pages 8 to 26.

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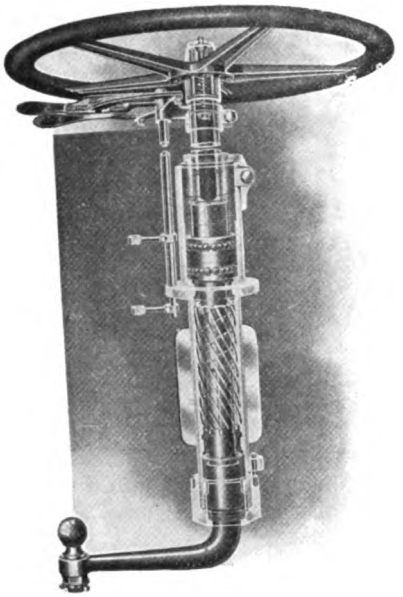

ROSS STEERING GEARS

ARE THE
AMERICAN STANDARD
ON
MOTOR TRUCKS

You will find them in a great majority of motor trucks operating today. Are your trucks equipped with them? If not, they should be. We make better steering gears than you can make—because that is our specialty and we devote our entire time and energy to producing the best possible STEERING GEARS and ROSS DIFFERENTIALS for motor trucks.

Write us for blue prints and catalogue of these two parts.

ROSS GEAR & TOOL CO. 949 Main St., Lafayette, Ind.

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GEARS (Continued)

TRANSMISSION GEARS (Continued)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FROST Gear & Forge Co., Jackson, Mich. (See page 167.)

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O. (See page 189.)

JAMESVILLE Mfg. Co., Batavia, N. Y.

KRICK Co., 1373 E. 55th St., Chicago, Ill.

LEFEVER Arms Co., 1 Maltbie St., Syracuse, N. Y.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa. (See page 135.)

LIGHT Mfg. & Foundry Co., Pottstown. Pa. (See page 103.)

MECHANICS Machine Co., Ninth St. & 19th Ave., Rockford, Ill.

MOTOR Engineering Co., Cleveland O. "Ruetschi."

MOTOR Mechanism Co., Society of Savings Bldg., Cleveland, O.

MUNCIE Gear Works, Muncie, Ind.

NEW YORK Gear Works, 56-58 Greenpoint Ave., Brooklyn, N. Y. "Ball." (See page 469.)

PARKER Transmission & Appliance Co., Fulton, N. Y.

PITTSBURGH Model Engine Co., Pittsburgh, Pa. (See page 401.)

ROCHESTER Motors Co., 5 Wren St., Rochester, N. Y.

ROSS Transmission Gear Co., Detroit, Mich.

RUETSCHI—See Motor Engineering Co.

SUPERIOR Machine Tool Co., Kokomo, Ind.

SUPERIOR Machine & Engineering Co., 51-53 Fort St., E., Detroit, Mich.

SYRACUSE Gear Co., 101 Grape St., Syracuse, N. Y.

TURLEY Gear & Machine Co., 1505-11 N. Tenth St., St. Louis, Mo.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Co., T. W., Kilgore & Perkins Aves., Muncie, Ind.

WARNER Gear Co., Muncie, Ind. (See page 239.)

WARNER Mfg. Co., Toledo, O. (See page 405.)

YUSTER Axle & Transmission Co. of America, South Bend, Ind.

BLANK GEARS

(See also Forgings; also Castings)

ANDERSON Forge & Machine Co., Detroit, Mich. (See page 169.)

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y. (See page 247.)

B. N. D.—See Elliott, H. A.

BILLINGS & Spencer Co., Hartford, Conn.

BLAKESLEE Forging Co., Plantsville, Conn.

CLEVELAND Hardware Co., Cleveland, O.

COLUMBUS Forge & Iron Co., Columbus, O.

DETROIT Screw Works, Detroit, Mich. (See page 341.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 527.)

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.) "B. N. D."

FRASSE & Co., Peter A., New York, N. Y. (Importers.) (See page 219.)

GANSCHOW Co., Wm., 1001-05 Washington Blvd., Chicago, Ill. (See page 469.)

GENERAL Drop Forge Co., Buffalo, N. Y. (See page 273.)

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y. (See page 429.)

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O. (See page 189.)

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn. (See page 297.)

JOLIET Forge Co., Irving & Franklin Sts., Joliet, Ill.

KRUPP—See Prosser & Son.

McINNES Steel Co., Corry, Pa.

MICHIGAN Screw Co., Lansing, Mich.

NEW England Forge Co., 9 Plymouth St., Worcester, Mass.

OBENBERGER Drop Forge Co., Milwaukee, Wis. (See page 475.)

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 381.)

REESE Machine & Tool Works. S., 224-30 W. Main St., Plymouth, Pa.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 343.)

METAL GEARS AND PINIONS

ADAMS Co., Dubuque, Ia.

ALBAUGH-DOVER Co., 2100 Marshall Blvd., Chicago, Ill. (See page 307.)

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Die & Tool Co., Reading, Pa. (See page 189.)

ANDERSON Rolled Gear Co., Berea Rd. & L. S. & M. S. R. R., Cleveland, O.

ARTHUR Co., 188 Front St., New York N. Y.

BEHRENDT, H. F., 22 Green St., Newark N. J.

BILGRAM Machine Works, 1235 Spring Garden St., Philadelphia Pa.

BOSTON Gear Works, Norfolk Downs Mass. (See page 313.)

Complete Index to Classification appears on Pages 8 to 26.

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Freedom

from Gear Shifting Troubles

Here, at last, is a solution of the Gear Shifting problem; solved *electrically*, in a simple and satisfactory manner by the

VULCAN ELECTRIC GEAR SHIFT

Here are some of its advantages:

1—It is easy to operate. No stooping over; no muscular effort required; a woman can operate it as easily as a man. Merely push the button and press the clutch pedal, and the magnet in the transmission responds with an instantaneous pull of 120 pounds.

2—It can be operated without removing the hand from the steering wheel or the eyes from the road ahead.

3—It enables gears to be shifted literally with a lightning-like speed, a great advantage when worming one's way through congested traffic or driving in rough, mountainous country.

4—It enables the driver to anticipate speed changes without actually changing speed until ready to do so. The electric circuit to the gear shifting magnet is completed only when the clutch pedal is pushed **ALL THE WAY DOWN.** Pressing one of the selective push buttons or slipping the clutch produces no effect, but pressing a button and pushing the clutch all the way down shifts the gears instantly.

5—The clutch must always be fully disengaged and the gears thrown to the neutral position, mechanically, before a shift can be made, thus making it impossible to strip a gear.

6—The amount of current required to operate a Vulcan Electric Gear Shift is very slight, as the current is consumed only at the instant the gear shifting solenoid is energized.

7—The Vulcan Electric Gear Shift provides the one thing needed to make the gasoline vehicle an electrically controlled car. The starting crank has gone. The hand lever gear shift is following it. **THIS IS THE AGE OF ELECTRICITY.**

The Vulcan Electric Gear Shift will be the sensation of 1915.

Get full particulars from the

Vulcan Electric Gear Shift Dept.

THE CUTLER-HAMMER MFG. CO.

Milwaukee, Wisconsin

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GEARS (Continued)

METAL GEARS AND PINIONS (Continued)

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CINCINNATI Gear Co., 1825-33 Reading Rd., Cincinnati, O.

CLEVELAND Worm & Gear Co., 990-92 E. 67th St., Cleveland, O.

CROSS Gear & Engine Co., Detroit, Mich. (See page 307.)

CURRIE & Son, J. B., 72 Adams St., Brooklyn, N. Y.

DETROIT Gear & Machine Co., Detroit, Mich. (See page 187.)

DETROIT Standard Gear Co., 742 Woodbridge St., E., Detroit, Mich.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 527.)

EARLE Gear & Machine Co. (Germantown). Philadelphia, Pa.

ELLIS Co., W. E., 357 River St., Haverhill, Mass.

FLATHER Mfg. Co., E. J., Nashua, N. H.

FOOTE Bros. Gear & Machine Co., 210-20 N. Carpenter St., Chicago, Ill.

FROST Gear & Forge Co., Jackson, Mich. (See page 167.)

GANSCHOW Co., Wm., 1001-05 Washington Blvd., Chicago, Ill. (See page 469.)

GEAR Grinding Machine Co., Chene St. & Boulevard, Detroit, Mich.

GLEASON Works, 1000 University Ave., Rochester, N. Y.

GOULD & Eberhardt, N. J. R. R. Ave. & Green St., Newark, N. J.

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O. (See page 189.)

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HINDLEY Gear Co., 1105 Frankford Ave., Philadelphia, Pa.

HOOSIER Motor Co., Goshen, Ind.

KEYSTONE-HINDLEY Gear Co., Pennsylvania Bldg., Philadelphia, Pa.

MEISEL Press Mfg. Co., 944-48 Dorchester Ave., Boston, Mass.

MEISSELBACH-CATUCCI Mfg. Co., Newark, N. J.

MILLHOLLAND Machine Co., W. K., 29th & Canal Sts., Indianapolis, Ind.

MUNCIE Gear Works, Muncie, Ind.

NEW England Gear Works, 100 Purchase St., Boston, Mass.

NEW Process Gear Corp., Syracuse, N. Y. (See page 195.)

NEWARK Gear Cutting Machine Co., 69 Prospect St., Newark, N. J.

NILSON-MILLER Co., 13th & Hudson Sts., Hoboken, N. J.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

NUTTALL Co., R. D., McCandless St. & Harrison Ave., Pittsburg, Pa.

PENNSYLVANIA Gear Works, 437 N. Broad St., Philadelphia, Pa.

PHILADELPHIA Gear Works, 1120 Vine St., Philadelphia, Pa.

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind. (See page 183.)

ROSS Machine Co., 208 S. Fourth St., La Fayette, Ind.

RUSSEL Wheel & Foundry Co., Detroit, Mich.

SAWYER Gear Works, 227 St. Clair St., Cleveland, O.

SIER-BATH Co., 143 W. 54th St., New York, N. Y. (See page 475.)

SOUTH Park Mfg. Co., Port Huron, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 289.)

SYRACUSE Rawhide Mfg. Co., Niagara & Shonnard Sts., Syracuse, N. Y.

T. C. M. Mfg. Co., Hunterdon & First Sts., Harrison, N. J.

TIMKEN—David Brown Co., Detroit, Mich.

TURLEY Gear & Machine Co., 1505-11 N. Tenth St., St. Louis, Mo.

VAN Dorn & Dutton Co., Cleveland, O. (See page 429.)

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind. (See page 239.)

WOBURN Gear Works, 32 Nashua St., Woburn, Mass.

WORCESTER Gear Works, 31 N. Foster St., Worcester, Mass.

RAWHIDE GEARS AND PINIONS

BOSTON Gear Works, Norfolk Downs, Mass. (See page 313.)

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

ELLIS Co., W. E., 357 River St., Haverhill, Mass.

FROST Gear & Forge Co., Jackson, Mich. (See page 167.)

GANSCHOW Co., Wm., 1001-05 Washington Blvd., Chicago, Ill. (See page 469.)

MEISEL Press Mfg. Co., 944-48 Dorchester Ave., Boston, Mass.

NEW England Gear Works, 100 Purchase St., Boston, Mass.

NEW Process Gear Corp., Syracuse, N. Y. (See page 195.)

NUTTALL Co., R. D., McCandless St. & Harrison Ave., Pittsburg, Pa.

PHILADELPHIA Gear Works, 1120 Vine St., Philadelphia, Pa.

SIER-BATH Co., 143 W. 54th St., New York, N. Y. (See page 475.)

SYRACUSE Rawhide Mfg. Co., Niagara & Shonnard Sts., Syracuse, N. Y.

VAN DORN & Dutton Co., Cleveland, O. (See page 429.)

WOBURN Gear Works, 32 Nashua St., Woburn, Mass.

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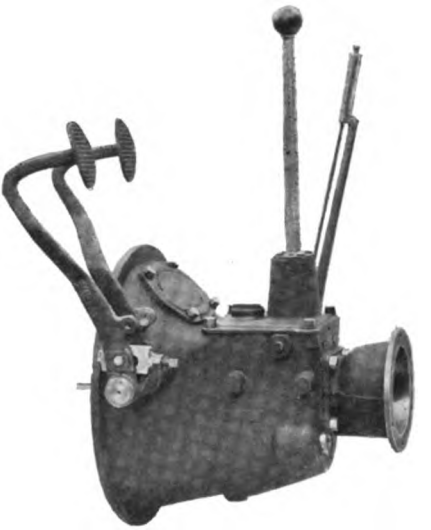
Detroit Gear and Machine Co.

DETROIT, MICHIGAN

Transmission Manufacturers

UNIT POWER PLANT TRANSMISSIONS TO FIT ALL STANDARD MOTORS UP TO 40 H.P.



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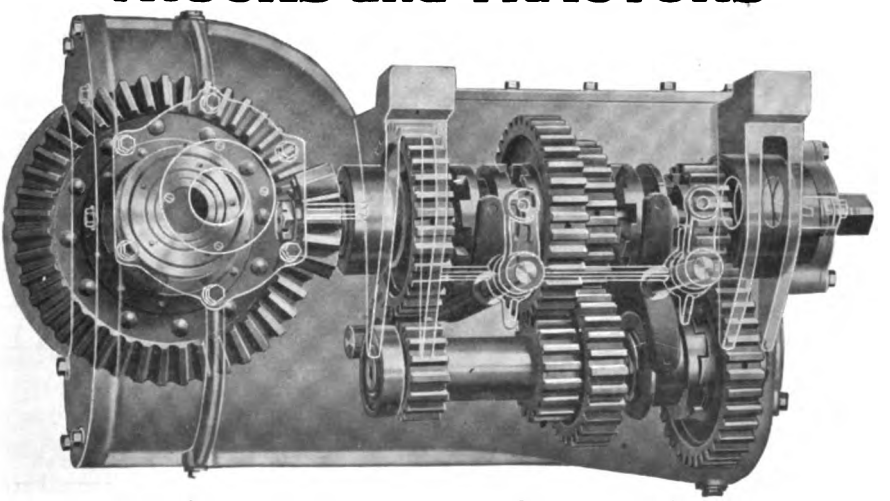
ONE TO TEN TONS CAPACITY

FOR

TRUCKS and TRACTORS



Selective type **Gears always in mesh**

No Plain Bearings—Mainshaft gears mounted on Roller bearings

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814 South Main Street **Rockford, Illinois**

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GENERATORS

ACETYLENE GAS GENERATORS

(For Acetylene Tanks—See Tanks, Acetylene)

BADGER Brass Mfg. Co., Lyman Ave., Kenosha, Wis. "Solar."

BROWN Mfg. Co., John W., Columbus, O

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill.

COLUMBIA—See Hine-Watt Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Handy."

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 229.)

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn. "Old Sol."

GRAY & Davis, Boston, Mass.
(See page 231.)

HANDY—See Dietz Co.

HINE-WATT Mfg. Co., 180 N. Market St., Chicago, Ill. "Columbia."

HOFACKER Mfg. Co., 555 W. 42d St., New York, N. Y.
(See page 205.)

NEVEROUT—See Rose Mfg. Co.

OLD SOL—See Hawthorne Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N. J.
(See page 433.)

SOLAR—See Badger Brass Mfg. Co.

SUPERIOR Lamp Mfg. Co., 136 W. 52d St., New York, N. Y.

TANK O' GAS Co., 25 Bramhall St., Portland, Me.

VICTOR Lamp Co., Colerain & Sassafras Sts., Cincinnati, O.

GLASS

POLISHED PLATE GLASS

HARRIS, Chas. H., 142-46 W. 24th St., New York, N. Y.
(See page 189.)

SMITH, Thos. J. D., 65-71 Chambers St., Newark, N. J.

WIRE GLASS

(For use in Glass Fronts and Wind Shields)

MISSISSIPPI Wire Glass Co., 220 Fifth Ave., New York, N. Y.

GLASSES

GAUGE AND LUBRICATOR GLASSES

BACHE & Co., Semon, West & Hubert Sts., New York, N. Y.

LIPPINCOTT Glass Co., Miles Greenwood Bldg., Cincinnati, O.

MONCRIEFF—See Rogers Co.

PERTH—See Rogers Co.

ROGERS Co., H. A., 87 Walker St., New York, N. Y. (Importers.) "Moncrieff," "Unific," "Perth."

UNIFIC—See Rogers Co.

GLOVES

ELECTRICALLY HEATED GLOVES

CARRON & Co., 75 Beekman St., New York, N. Y.

MOTORISTS GLOVES AND GAUNTLETS

ADIRONDACK—See Spear-Martin Fur Co.

ALLEN & Sons, John C., Gloversville, N. Y.

AMERICAN Buffalo Robe Co., 1-7 Howell St., Buffalo, N. Y.

AMERICAN Glove Co., 2013 Churchill St., Chicago, Ill.

BISHOP Co., J. H., Wyandotte, Mich.

BLACK GHOST—See Heagle, James.

BRADFORD, R. E., 51 E. Fulton St., Gloversville, N. Y.

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

EISENDRATH Glove Co., Armitage & Elston Aves., Chicago, Ill.

ELLSWORTH & Thayer Mfg. Co., 336-40 Broadway, Milwaukee, Wis. "Kantryp."

FRIED, Ostermann, Meyer Co., 617 Reed St., Milwaukee, Wis. "Price."

GLOVERSVILLE Auto Glove Co., 42 Grand St., Gloversville, N. Y. "M. W. M."

GRINNELL—See Morrison-Ricker Mfg. Co.

GRIP-TITE—See Morrison-Ricker Mfg. Co.

HANSEN Mfg. Co., O. C., Detroit & Milwaukee Sts., Milwaukee, Wis.

HEAGLE, James, First Ave. & Market St., Johnstown, N. Y. "Black Ghost."

KANTRYP—See Ellsworth & Thayer Mfg. Co.

LA CROSSE Knitting Mills, La Crosse, Wis.

LUTHER Glove Co., J. P., Berlin, Wis. "Red Ball."

M. W. M.—See Gloversville Auto Glove Co.

MORAWETZ Co., 217-25 E. Water St., Milwaukee, Wis.

MORRISON-RICKER Mfg. Co., 72 Broad St., Grinnell, Ia. "Grinnell," "Rist-Fit." "Grip-Tite."
(See page 191.)

NORTHROP—See Syracuse & Eldridge Glove & Legging Co.

PONTIAC Knitting Co., Pontiac, Mich.

PRICE—See Fried, Ostermann, Meyer Co.

RED BALL—See Luther Glove Co.

RIPON Knitting Works, Ripon, Wis.

RIST-FIT—See Morrison-Ricker Mfg. Co.

SINCLAIR Glove Co., 1307 S. Union St., Los Angeles, Cal.

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"Quality Glass for Quality Cars"

Perfect GLASS of uniform thickness for

CLOSED AUTOMOBILE BODY WORK, FRAMELESS WINDOWS, WINDSHIELDS.

Complete stock of **GLASS** in 1/8 in., 3/16 in., and 1/4 in. thickness.

Special facilities for **round and flat polishing of edges on glass.**

We can ship your order at once.

CHAS. H. HARRIS

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Equip Your Cars With the

Grant-Lees

Electric Welded Differential

The most satisfactory and efficient differential manufactured. The rivets are electrically welded, leaving no open seams and doubling the assembled strength. Season after season this differential performs its function quietly and perfectly—no noise, no trouble, certain service.

If you would have quiet serviceable and reliable rear axles, specify the

Grant-Lees
Electric Welded Differential

The Grant-Lees Gear Co.

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2368 Sixty-Ninth St., Cleveland O.

GEARS

TRANSMISSIONS — PARTS

Products
The 58BC Transmission, standard on the best cars; Transmission shafts and other parts—and gears in profusion — any type — any size—any quantity.

Price
Unusual "big lots" manufacturing facilities hold prices *down* — and bring quality *up*. And this applies to one piece or ten thousand.

Delivery
Immediate—because standard gears and parts for most cars are in stock. Special lots delivered promptly. Just try this service *once*—but give name of car, maker's model number, part, etc.

American Die & Tool Company

Reading Pa.

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GLOVES (Continued)

MOTORISTS GLOVES AND GAUNTLETS (Continued)

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

SYRACUSE & Eldridge Glove & Legging Co., 1020 S. Salina St., Syracuse, N. Y. "Northrop."

WALLACE Co., Hugh, 2626 E. Grand Boulevard, Detroit, Mich.

GOGGLES

MOTORISTS GOGGLES AND EYE SHIELDS

ADAMS, William C., 332 Boylston St., Boston, Mass. (See page 495.)

ALBEX—See Willson & Co.

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

AUTOCRAT—See American Thermo Ware Co.

AUTOGLAS—See Hardy Co.

BOSTON—See Chicago Eye Shield Co.

CHEYENNE—See Chicago Eye Shield Co.

CHICAGO Eye Shield Co., 128 S. Clinton St., Chicago, Ill. "Boston," "Rex," "Panama," "Cheyenne."

COOKS—See Iowa Optical Co.

DIMMER Goggle Co., Whiting, Ind.

EFF & SEE—See Frank & Co., Arthur.

ESSEX Rubber Co., Trenton, N. J.

FRANK & Co., Arthur, 71-73 Nassau St., New York, N. Y. "Eff & See."

FRIEDLANDER & Bro., Joseph, 8 Maiden Lane, New York, N. Y.

GENERAL Optical Co., 538-40 First Ave., New York, N. Y. "Gogglette."

GLOBE Optical Co., 403 Washington St., Boston, Mass.

GOGGLETTE—See General Optical Co.

HARDY Co., F. A., Chicago, Ill. "Autoglas."

IOWA Optical Co., New London, Ia. "Cooks."

KING Optical Co., F. W., Ellastone Bldg., Cleveland, O.

KING Optical Co., Julius, 10-12 Maiden Lane, New York, N. Y.

LEASURE Eye & Nose Shield Co., 4 Sanford St., Bradford, Pa.

LLOYD Co., Andrew J., 315 Washington St., Boston, Mass. (Importers.)

NON-STRAIN—See Opthalmuscope Co.

OPTHALMUSCOPE Co., 437 Dorr St., Toledo, O. "Non-Strain."

PANAMA—See Chicago Eye Shield Co.

REX—See Chicago Eye Shield Co.

SPENCER Optical Co., 5-7 Maiden Lane, New York, N. Y.

STANDARD Optical Co., Geneva, N. Y.

SUSSFELD, Lorsch & Co., 90 Maiden Lane, New York, N. Y.

WHITE-HAINES Optical Co., Columbus, O.

WILLSON & Co., T. A., Reading, Pa. "Albex."

YATMAN Rubber Co., 267-69 Mt. Pleasant Ave., Newark, N. J.

GONGS

MECHANICAL GONGS

(See Bells, Mechanical)

GRAPHITE

LUBRICATING GRAPHITE

(For Graphite Grease—See Lubricants)

CHESTER Graphite Co., Chester Springs, Pa.

DIXON Crucible Co., Joseph, Jersey City, N. J. (See page 191.)

INTERNATIONAL Acheson Graphite Co., Niagara Falls, N. Y.

UNITED States Graphite Co., Saginaw, Mich.

WISCONSIN Graphite Co., Stevens Point, Wis.

GREASES

CUP AND GEAR GREASES

ACHESON Oildag Co., Port Huron, Mich. "Gredag."

ADAMS Grease & Oil Co., 161 W. 51st St., New York, N. Y.

ADVANCE Oil Works, 310-12 Flushing Ave., Brooklyn, N. Y.

AJAX Oil & Grease Co., 170 W. 65th St., New York, N. Y.

ALBANY Lubricating Co., 708-10 Washington St., New York, N. Y. "Cooks."

ALEXANDER & Co., H. T., 17 Battery Pl., New York, N. Y. "Grand Prix."

AMALIE—See Sonneborn Sons.

AMERICAN—See Miller Co.

AMERICAN Oil Co., Jackson, Mich. "Amoco," "Gearo."

AMOCO—See American Oil Co.

ARCO—See Atlantic Refining Co.

ARGO—See Van Tilburg Oil Co.

ATLANTIC Refining Co., Euclid Ave. & E. 65th St., Cleveland, O. "Arco."

ATLAS—See Swan & Finch Co.

AURORA—See Pigot-Sayre Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich. "Diamond Cross."

AUTOGREASE—See Ilsley, Doubleday & Co.

BADGER—See Wadhams Oil Co.

BAKER, Wm. T., 220-32 Suydam Ave., Jersey City, N. J. "Safeguard."

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Dry like new, after washing in soap and water or gasoline

Grinnell Gloves

Style 4827 The famous Grip-Tite

Best for every purpose

Even without "Grip-Tite," "Ventilated Back" and "Rist-Fit" — three big, exclusive Grinnell features — Grinnell Gloves would be the favorite of the motorist because they can be washed so easily right on the hands and because of the skill and excellence of their making. Grinnell Gloves are made of the finest Colt or Reindeere—soft as velvet, wear like iron.

Get a pair on approval

Ask your dealer for Grinnell Gloves. If he does not handle them, send us his name and your size. Your selection will be sent on approval. Write for Free Glove Booklet and samples of leathers.

DEALERS—Write for our proposition!

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72 Broad St., Grinnell, Ia.

Dixon's Graphite
Transmission and Differential
Grease No. 677

When you use this splendid mixture of the finest natural flake graphite with a high-grade mineral grease, the rubbing and grinding which wear out your gears and bearings comes upon the hard, smooth, almost frictionless veneer of pure graphite which builds up over the metal—and wear and noise and wasted power are minimized. Send for "Lubricating the Motor," No. 35.

Made in JERSEY CITY, N. J., by the
Joseph Dixon Crucible Company
Established 1827

Two New Products

Lesoyl, a semi-fluid graphite compound, to be mixed with lubricating oils and greases. It saves oil and improves lubrication.
No. 1 Can (sufficient for 5 gals. of oil or 10 lbs. of grease), $1.00 postpaid in the U. S.

Autobronze, a hard, strong bronze, intended for severe work—and for the repair shop, the garage and the automobile plant. (Carried in stock, bushings and solid bars, all sizes up to 4" dia., in 12" lengths.)

Lumen Bearing Company
Brass Founders
Buffalo

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CUP AND GEAR GREASES (Continued)

BALKAN—See Jones & Bro., J.

BANNER—See Clarkson & Ford Co.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BELL Oil Co., 53 E. Ferry St., St. Louis, Mo. "Liberty Bell."

BESLY & Co., Charles H., 118-24 N. Clinton St., Chicago, Ill. "Helmet."

BISON—See Cataract Refining & Mfg. Co.

BLACK DIAMOND—See Sweet, Charles F.

BLIVEN & Carrington, 125 Broad St., New York, N. Y. "E-Z-Way."

BORNE, Scrymser Co., 80 South St., New York, N. Y. "Colonial," "Silex." **(See page 271.)**

BUCK & Co., E. A., Worcester, Mass.

BURKO Grease Co., 3821 Baring St., Philadelphia, Pa.

CALYPSOL—See Cataract Refining & Mfg. Co.

CAROLENE—See Valley Oil Co.

CASCADE—See Cataract Refining & Mfg. Co.

CASSCO Bar-Metallic Packing Co., 8 S. Dearborn St., Chicago, Ill.

CATARACT Refining & Mfg. Co., Marine National Bank Bldg., Buffalo, N. Y. "Bison," "Calypsol," "Cascade."

CHAINOLENE Mfg. Co., Phipps Power Bldg., Pittsburgh, Pa.

CHESTER Graphite Co., Chester Springs, Pa. "Hexagon."

CINCINNATI Oil Works Co., Cincinnati, O. **(See page 417.)**

CLARKSON & Ford Co., 55 Water St., New York, N. Y. "Banner."

CLIMAX—See Sweet, Charles F.

COLONIAL—See Borne, Scrymser Co.

COLUMBIA Refining Co., 90 West St., New York, N. Y. "K. A. C."

CONNECTICUT Oil Co., 549 S. Leonard St., Waterbury, Conn.

CONTINENTAL Asbestos Corp., 7-11 Summer St., Worcester, Mass. "Spedolene."

COOKS—See Albany Lubricating Co.

CRANE & Co., 91 Oliver St., Boston, Mass. "Eureka."

CRAWFORD Co., Wm. J., 14 Wood St., Pittsburg, Pa.

CROWN—See Kellogg & Co.

DETROIT—See Zurn Co.

DIAMOND CROSS—See Auto Oil Co.

DIXON Crucible Co., Joseph, Jersey City, N. J. **(See page 191.)**

DRAKE Oil Co., 99 E. Spring St., Titusville, Pa.

DUPLEX—See Enterprise Oil Co.

E-Z-WAY—See Bliven & Carrington.

EAGLE Oil & Supply Co., Boston, Mass. "Eagleine." **(See page 273.)**

EAGLEINE—See Eagle Oil & Supply Co.

EBONITE—See Oil City Oil & Grease Co.

ECONOMY—See Pennsylvania Lubricating Co.

EMCO—See Emery Mfg. Co.

EMERY Mfg. Co., Bradford, Pa. "Emco."

EMPIRE—See Richardson Lubricating Co.

ENERGINE Refining & Mfg. Co., The Arcade, Cleveland, O.

ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

ENTERPRISE Oil Co., 164 Chandler St., Buffalo, N. Y. "Duplex."

EUREKA—See Crane & Co.

EXCELSIOR—See Kellogg & Co.

EXCELSIOR—See Miller's Sons.

EXCELSIOR—See Mills Oil Co.

FAULTLESS—See Hawkeye Oil Co.

FIBROVISCOS—See Sheppard, W. S.

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Lubroleine."

FRANK Oil Co., 23 W. Spring St., Titusville, Pa.

FRANKLIN Oil Works, E. Atlantic Ave., Franklin, Pa.

FRAZER Lubricator Co., 3921 Normal Ave., Chicago, Ill.

FULCRUM Oil Co., Franklin, Pa.

GEARO—See American Oil Co.

GERMANIC—See Wood Co.

GOLD MEDAL—See Monarch Mfg. Co.

GRAND PRIX—See Alexander & Co.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O.

GREDAG—See Acheson Oildag Co.

GREE-NO-CO—See Greenslade Oil Co.

GREEN Seal Grease Co., Broad & Wallace Sts., Philadelphia, Pa.

GREENSLADE Oil Co., 40 Jefferson Ave., Detroit, Mich. "Gree-no-co."

GREOIL—See Robinson & Son Co.

HAGGERTY Refining Co., 50 South St., New York, N. Y. "Thermo."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I.

HARRIS & Co., Elmer E., 2 Maurice St., Buffalo, N. Y.

HARRISON Agalite Lubricating Co., Syracuse, N. Y.

HAVOLINE—See Indian Refining Co.

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HAWS, George A., 142-44 Front St., New York, N. Y. "Panhard." **(See page 273.)**

HELMET—See Besly & Co.

HEXAGON—See Chester Graphite Co.

HIGH Grade Oil Refining Co., 68 Broad St., New York, N. Y. "Hygrade."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

HYGRADE—See High Grade Oil Refining Co.

IDEAL—See Sheppard, W. S.

ILSLEY, Doubleday & Co., 229-31 Front St., New York, N. Y. "Autogrease."

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Detroiter

$1050 With Westinghouse Starting and Lighting System

FIRST
Pure European Streamline In This Country

FIRST
Long-Stroke Ball-Bearing Motor

Full Floating Rear Axle, Platform Rear Spring Suspension, All Recording Instruments in One Unit, Red Electric Flash Oil Gauge, Carburetor above Frame, 112-Inch Wheel Base, Left Hand Drive, Center One-Lever Control, Multiple Disc Clutch in Oil, Less than 2300 Pounds, 32 h.p.

Briggs-Detroiter Co

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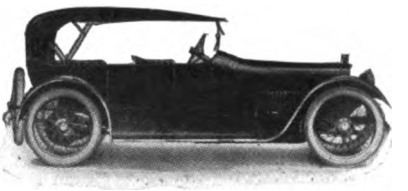
PULLMAN

MODEL 6-48

A MODERN CLASSIC



Price $2500

Including VULCAN ELECTRIC GEAR SHIFT

Fours and Sixes, $750 to $3000

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York Pa.

CHANDLER

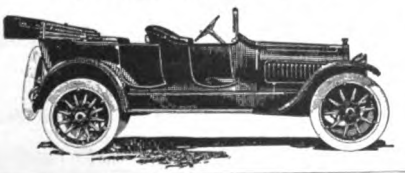
LIGHT WEIGHT SIX—1915

$1595

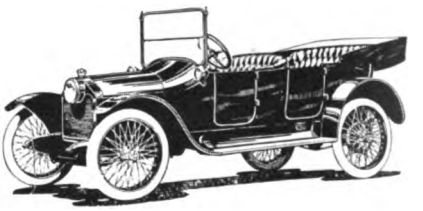
IT weighs 2885 pounds completely equipped—ON THE SCALES. It runs 16 miles per gallon gasoline. It runs 700 miles per gallon oil. Owners average 7000 miles per set tires. And it possesses every high grade feature found on high priced sixes. Speed 3 to 55 miles an hour without shifting gears. Climbs every hill between Boston and Chicago on high. Rides the bumps like a boat.

And for 1915—ten per cent more power and many added refinements—at the new profit-sharing price, $1595.

CHANDLER MOTOR CAR CO.
CLEVELAND, OHIO



BRISCOE



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Briscoe Motor Company, Inc.
Jackson, Mich.

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GREASES (Continued)

CUP AND GEAR GREASES (Continued)

INDIAN Refining Co., 17 Battery Pl., New York, N. Y. "Havoline."

INTERSTATE Chemical Co., 12-20 Bayview Ave., Jersey City, N. J.

INVADER Oil Co., 80 Broad St., New York, N. Y.

JONES & Bro., J., 429 Locust St., Philadelphia, Pa. "Balkan."

K. A. C.—See Columbia Refining Co.

KANTER Co., R. J., 647 Water St., New York, N. Y.

KELLOGG & Co., E. H., 242-44 South St., New York, N. Y. "Crown." "Excelsior."

KENDALL Refining Co., Bradford, Pa. "Royal."

KEYSTONE Lubricating Co., 1331 Race St., Philadelphia, Pa.

KILNOYS—See Miller Co.

LESOYL—See Lumen Bearing Co.

LIBERTY BELL—See Bell Oil Co.

LION—See Moore Oil Co.

LOOS & Dilworth, 134 S. Front St., Philadelphia, Pa. "Paragon."

LUBROLEINE—See Fiske Bros. Refining Co.

LUMEN Bearing Co., Buffalo, N. Y. "Lesoyl."
(See page 191.)

McLEAN-JONES Oil & Supply Co., 40 India Wharf, Boston, Mass. "Swastika."

MARATHON—See Weinberg & Co.

MARSHALL Oil Co., Marshalltown, Ia. "Moco," "Rex."

METEOR—See Narragansett Chemical Co.

MICAFLAKE—See U. S. Mica Mfg. Co.

MILLER Co., Wm. P., 244-50 Green St., Brooklyn, N. Y. "American." "Kilnoys."

MILLER'S Sons, Wm. P., 298-302 Hancock St., Long Island City, N. Y. "Excelsior."

MILLERS Sons Co., A. D., Columbus & Preble Aves., Pittsburg, Pa. "Perfection."

MILLS Oil Co., C. E., 263 Walton St., Syracuse, N. Y. "Excelsior."

MOCO—See Marshall Oil Co.

MONARCH Mfg. Co., Council Bluffs, Iowa. "Gold Medal."

MONOGRAM—See New York Lubricating Oil Co.

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O. "Lion."

MOTORLIGHT—See Petroleum Coke Co.

MOTORLUBE—See Tygert Co.

NAPOLEON—See Van Tilburg Oil Co.

NATIONAL Refining Co., Rose Bldg., Cleveland, O.

NARRAGANSETT Chemical Co., 155-61 Orange St., Providence, R. I. "Meteor."

NATIONAL Oil & Supply Co., 180 Freylinghuysen Ave., Newark, N. J. "Viscos."

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram."
(See page 275.)

NEW York & New Jersey Lubricant Co., 165 Broadway, New York, N. Y. "Non-Fluid."

NOBETR—See Sawyer Oil Co.

NON-FLUID—See New York & New Jersey Lubricant Co.

NORTHWESTERN Chemical Co., Marietta, O.
(See page 129.)

OIL City Oil & Grease Co., 365-77 Seneca St., Oil City, Pa. "Pensoil," "Ebonite."

OIL Products Co., 17 Battery Pl., New York, N. Y. "Usoline."

OILZUM—See White & Bagley Co.

ORIENTAL—See Reliance Oil & Grease Co.

OTTOMO—See Pioneer Mfg. Co.

OWL—See Western Chemical Mfg. Co.

PALUBCO—See Pennsylvania Lubricating Co.

PANAMA Oil & Grease Co., 159-61 W. 51st St., New York, N. Y.

PANHARD—See Haws, Geo. A.

PARAGON—See Loos & Dilworth.

PARAGON Refining Co., Front St., Toledo, O. "Polar."

PATTERSON Lubricating Co., 114 Broad St., Boston, Mass.

PENN—See Pennsylvania Lubricating Co.

PENN Oil & Supply Co., Chicago, Ill.

PENNSYLVANIA Lubricating Co., 34th St. & A. V. Ry., Pittsburg, Pa. "Penn," "Sylvan," "Economy," "Palubco."

PENSOIL—See Oil City Oil & Grease Co.

PERFECTION—See Millers Sons Co.

PERFECTION—See Sawyer Oil Co.

PERFECTION—See Wood Co.

PERFECTO—See Young & Kimball.

PERRY Oil Co., 372 Central Ave., Pawtucket, R. I.

PETROLEUM Coke Co., Edgemont & Venango Sts., Philadelphia, Pa. "Motorlight."

PETROLEUM Products Co., 3600-10 Grant Blvd., Pittsburg, Pa. "Sound Proof."

PHILADELPHIA Grease Mfg. Co., 848-50 S. Swanson St., Philadelphia, Pa.

PIGOT-SAYRE Co., 71-72 Front St., New York, N. Y. "Aurora."

PIONEER Mfg. Co., 5220 Sweeney Ave., S. E., Cleveland, O. "Ottomo."

PIONEER Oil Co., Old South Bldg., Boston, Mass.

PLATT & Washburn Refining Co., 15 Broadway, New York, N. Y. "Veedol."
(See page 275.)

POLAR—See Paragon Refining Co.

POLARINE—See Standard Oil Co. of N. Y.

PURE Oil Co., First St. & 13th Ave., S., Minneapolis, Minn. "Puritan."

PURITAN—See Pure Oil Co.

PURITAN Oil Co., 1218 W. 70th St., Cleveland, O.

RELIANCE Oil & Grease Co., 1521 Columbus Rd., Cleveland, O. "Oriental."

REX—See Marshall Oil Co.

RICHARDSON Lubricating Co., Quincy, Ill. "Empire."

ROBINSON & Son Co., Wm. C., 32 South St., Baltimore, Md. "Greoil."

Complete Index to Classification appears on Pages 8 to 26.

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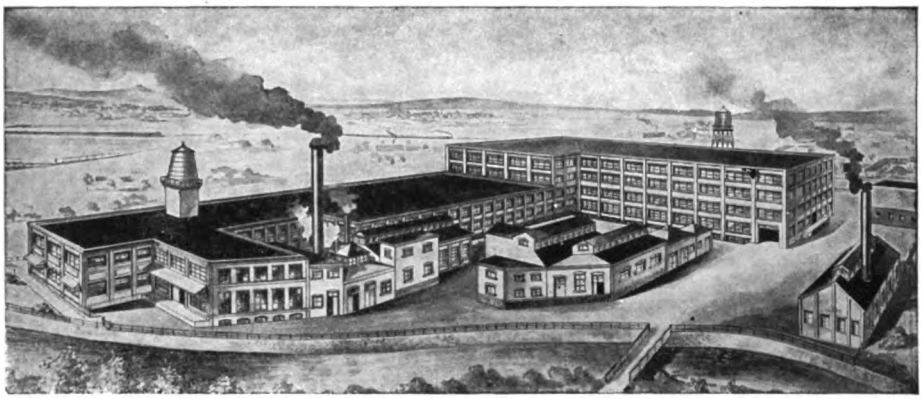

Announcement!

Constant increase in orders on contract work in metal gear cutting has again called for greater capacity in our plant.

We have therefore erected additions as shown and have added new equipment that practically doubles our facilities, thus making our complete plant *the largest in the world devoted exclusively to gear making and gear cutting.*

Our equipment now covers every requirement of quantity production of gears of any type, and includes Gleason bevel gear generators, Gould & Eberhardt blocking machines, Fellows gear shapers, Brown & Sharpe gear cutters, Gould & Eberhardt hobbing machines, Pratt & Whitney spiral threading machines, National Acme, Cleveland, Gridley and Potter & Johnston automatic lathes and Landis and Heald grinders. The hardening and heat treating department has been enlarged and six Gleason rotary oil furnaces installed in addition to our eight carbonizing furnaces, together with an oil refrigerating plant for regulating the temperature of the oil. A laboratory has also been added for the testing and analysis of the various alloy steels and gear metals used.

We stand ready to quote more attractive prices on quantity orders than ever. Send us your blue prints for estimate.

You can't put your gear work into better hands

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GREASES (Continued)

CUP AND GEAR GREASES (Continued)

ROYAL—See Kendall Refining Co.

SAFEGUARD—See Baker, Wm. T.

SAWYER Oil Co., Howard B., 65 Long Wharf, Boston, Mass. "Nobetr," "Perfection."

SHEPPARD, W. S., 21 Lawrence St., Newark, N. J. "Fibroviscos," "Ideal."

SILEX—See Borne, Scrymser Co.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SOUND PROOF—See Petroleum Products Co.

SPEARE'S Sons Co., Alden, 140 Sixth St., Boston, Mass.

SPEDOLENE—See Continental Asbestos Corp.

STANDARD Oil Co. of N. Y., New York, N. Y. "Polarine."

STAR Oil Co., 440-42 N. Halsted St., Chicago, Ill.

SULLIVAN Oil Co., 413 Wells St., Chicago, Ill.

SUPERIOR Oil Co., Century Bldg., Cleveland, O.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

SWAN & Co., Alden S., 135 Front St., New York, N. Y. "Swanovia."

SWAN & Finch Co., 151 Maiden Lane, New York, N. Y. "Atlas."

SWANOVIA—See Swan & Co.

SWASTIKA—See McLean-Jones Oil & Supply Co.

SWEET, Charles F., 247 State St., Hartford, Conn. "Climax," "Black Diamond."

SYLVAN—See Pennsylvania Lubricating Co.

TEXACO—See Texas Co.

TEXAS Co., 17 Battery Pl., New York, N. Y. "Texaco."

THERMO—See Haggerty Refining Co.

TOCO—See Tropical Oil Co.

TROJAN—See Van Tilburg Oil Co.

TROPICAL Oil Co., W. 70th St. & L. S. & M. S. Ry., Cleveland, O. "Toco."

TULC—See Universal Lubricating Co.

TYGERT Co., E. A., 126 N. Front St., Philadelphia, Pa. "Motorlube."

UNION Petroleum Co., 135 S. Second St., Philadelphia, Pa.

U. S. Mica Mfg. Co., Lytton Bldg., Chicago, Ill. "Micaflake."

UNITED States Graphite Co., Saginaw, Mich.

UNIVERSAL—See Young & Kimball.

UNIVERSAL Lubricating Co., Schofield Bldg., Cleveland, O. "Tulc."

USOLINE—See Oil Products Co.

VACUUM Oil Co., Rochester, N. Y.

VALLEY Oil Co., Century Bldg., Cleveland, O. "Carolene."

VALVOLINE Oil Co., 11 Broadway, New York, N. Y.

VAN NOSTRAND Mfg. Co., 136 Liberty St., New York, N. Y. "White Circle."

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Napoleon," "Argo," "Trojan."

VEEDOL—See Platt & Washburn Refining Co

VELVET—See Sutherland & Co.

VERACITY—See Warren Refining Co.

VISCO Motor Oil Co., 2104 Superior Viaduct, Cleveland, O.

VISCOS—See National Oil & Supply Co.

VISCOSITY Oil Co., 1101-03 W. 37th St., Chicago, Ill.

WADHAMS Oil Co., Milwaukee, Wis. "Badger."

WARREN Refining Co., 1137 W. 11th St., Cleveland, O. "Veracity."

WEINBERG & Co., J. H., 128 Maiden Lane, New York, N. Y. "Marathon."

WESTERN Chemical Mfg. Co., 151 Sixth St., Milwaukee, Wis. "Owl."

WHITE CIRCLE—See Van Nostrand Mfg. Co.

WHITE & Bagley Co., Worcester, Mass. "Oilzum." (See Back Cover.)

WHITMORE Mfg. Co., 33 Iron Ct., Cleveland, O.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

WOOD Co., W. A., 373 Atlantic Ave., Boston, Mass. "Perfection," "Germanic."

YOUNG, Orlando W., 277 Halsey St., Newark, N. J.

YOUNG & Kimball, Frank L., 111 Purchase St., Boston, Mass. "Universal." "Perfecto."

ZURN Co., O. F., 2736-38 N. Broad St., Philadelphia, Pa. "Detroit."

GRIPS

LEVER HANDLE GRIPS

GOODYEAR Tire & Rubber Co., Akron, O.

PEDAL GRIPS

AUTO Pedal Pad Co., 794 Seventh Ave., New York, N. Y. "Perfection."

NON-SLIP Auto Pedal Co., 140 Nassau St., New York, N. Y.

PERFECTION—See Auto Pedal Pad Co.

SIDWELL Pedal Mat Co., 245 Columbus Ave., Boston, Mass.

THROTTLE AND SPARK LEVER GRIPS

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

CONDENSITE Co. of America, Belleville Ave., Glen Ridge, N. J.

LUZERNE Rubber Co., Trenton, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

GUARDS

HORN BULB GUARDS

ASCO—See N. Y. Wire & Spring Co.

N. Y. Wire & Spring Co., 586-88 Washington St., New York, N. Y. "Asco." (See page 395.)

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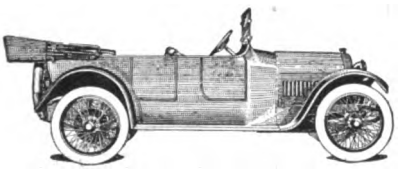

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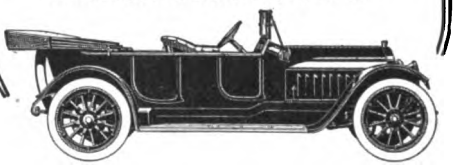

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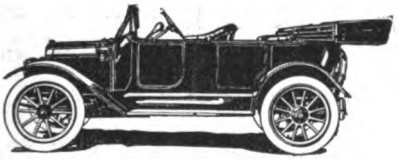

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WOODS MOBILETTE

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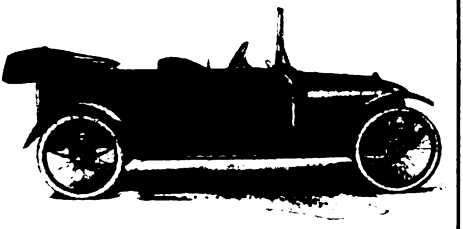

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Motor: Four Cylinder---12 h.p. water cooled.
Transmission: Sliding gear type, two speeds forward and one reverse.
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LEATHER MUD GUARDS AND FENDERS

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

PETERS-HERRON Dash Co., Gift & Culbertson Sts., Columbus, O.

METAL MUD GUARDS AND FENDERS

A-Z Co., 530 W. 56th St., New York, N. Y.

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

BRISCOE Mfg. Co., Detroit, Mich.

BRISKIN Mfg. Co., 539 N. Capitol Ave., Indianapolis, Ind.

BUNN-HUTCHINSON Co., 2074 E. 22d St., Cleveland, O.

BUSH Mfg. Co., Hartford, Conn. (See page 363.)

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

EUREKA Auto Parts Co., 1915 Pine St., St. Louis, Mo.

FORSYTH Bros. Co., Harvey, Ill.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

HARTFORD Sheet Metal Works, 325 N. Front St., Hartford, Conn.

HAYES Mfg. Co., Detroit, Mich.

HEARD Mfg. Co., 1318 S. Main St., Los Angeles, Cal.

IDEAL Sheet Metal Works, 2809 Michigan Ave., Chicago, Ill. (See page 327.)

JOHNSON'S Automobile Sheet Metal Works, W. N., 620-28 South J St., Richmond, Ind.

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y. (See page 199.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KINSEY Mfg. Co., Toledo, O.

LAWSON Co., F. H., Cincinnati, O.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MOLINE Pressed Steel Co., East Moline, Ill.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

PARAGON Auto-Parts Mfg. Co., 506 W. 53d St., New York, N. Y.

PERFEX Radiator Co., Racine, Wis.

REID Co., 1603 Second Ave., Moline, Ill.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SPRINGFIELD Metal Body Co., Springfield, Mass. (See page 71.)

SUSSMAN & Rosenberg Mfg. Co., M., Tarrytown, N. Y.

TODD Mfg. Co., 820-24 Mary Pl., Minneapolis, Minn.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

WOOD MUD GUARDS AND FENDERS

AMERICAN Veneer Co., 1501 Clinton St., Hoboken, N. J. (See page 151.)

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

GUNS

GREASE GUNS

AGNER Co., Raymond C., Burlington, Wis "Simplex."

B-LINE—See Randall-Faichney Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Maximus."

BIG DANE—See Miller & Starr Co.

BIGSBY Mfg. Co., 7500 Quincy Ave., Cleveland, O.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

COX Brass Mfg. Co., Albany, N. Y. (See page 511.)

ELMAR Mfg. Co., Alameda, Cal. "Freeman."

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

FREEMAN—See Elmar Mfg. Co.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HIPWELL Mfg. Co., 831-35 North Ave., W., Pittsburg, Pa.

INTERNATIONAL Automobile Supply Co., 117 W. South Water St., Chicago, Ill.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Victor." (See page 209 and 321.)

KELLOGG Mfg. Co., Rochester, N. Y. (See page 527.)

LACO—See Lubricating Accessories Co.

LITTLE GIANT—See Neiman Machine Wks.

LUBRICATING Accessories Co., 82 Court St., Paterson, N. J. "Laco."

MAXIMUS—See Beckley-Ralston Co.

MILLER & Starr Co., 250 Green St., Brooklyn, N. Y. "Big Dane."

NEIMAN Machine Works, Freeport, Ill. "Little Giant."

NOERA Mfg. Co., Waterbury, Conn.

RANDALL-FAICHNEY Co., Boston, Mass. "B-Line."

SANFORD Mfg. Co., F. C., 1235-41 Howard Ave., Bridgeport, Conn.

SIMPLEX—See Agner Co.

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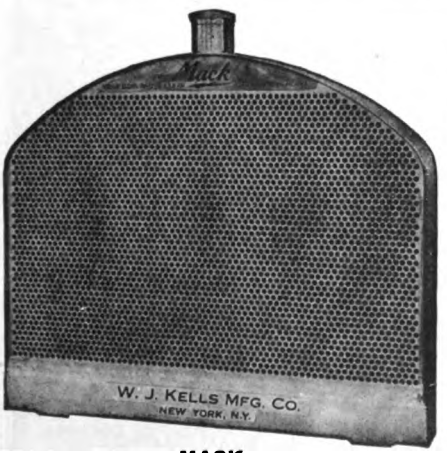

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GUNS (Continued)

GREASE GUNS (Continued)

SUNDERLAND Mfg. Co., 61 E. 24th St., Chicago, Ill.

TOWNSEND & Co., S. P., Orange, N. J.

VICTOR—See Judd & Leland Mfg. Co.

WILSON Instrument & Specialty Co., South & Second Sts., Passaic, N. J. "Wisco."

WISCO—See Wilson Instrument & Specialty Co.

OIL GUNS

AGNER Co., Raymond C., Burlington, Wis. "Simplex."

B-LINE—See Randall-Faichney Co.

BELL Pump Co., 74-78 Fort St., E., Detroit, Mich.
(See page 475.)

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston, Mass. "Premium."

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

COPLEY—See Randall-Faichney Co.

COX Brass Mfg. Co., Albany, N. Y.
(See page 511.)

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y.
(See pages 209 and 321.)

KELLOGG Mfg. Co., Rochester, N. Y.
(See page 527.)

LACO—See Lubricating Accessories Co.

LUBRICATING Accessories Co., 82 Court St., Paterson, N. J. "Laco."

NOERA Mfg. Co., Waterbury, Conn.

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn.
(See page 321.)

PREMIUM—See Blue Ribbon Mfg. Co.

RANDALL-FAICHNEY Co., Boston, Mass. "B-Line," "Copley."

SANFORD Mfg. Co., F. C., 1235-41 Howard Ave., Bridgeport, Conn.

SIMPLEX—See Agner Co.

WILSON Instrument & Specialty Co., South & Second Sts., Passaic, N. J. "Wisco."

WISCO—See Wilson Instrument & Specialty Co.

HAIR

UPHOLSTERY HAIR

ARMOUR Curled Hair Works, 31st Pl. & Benson Sts., Chicago, Ill.

BENTLEY Hair Co., Joseph, Methuen, Mass.

DELANY & Co., 209 N. Third St., Philadelphia, Pa.

GORDON Bros., Pierce & Orthodox Sts. (Frankford), Philadelphia, Pa.

MITCHELL Co., P. R., Spring Grove & Harrison Aves., Cincinnati, O.

MORRIS & Co., U. S. Yards, Chicago, Ill.

SULZBERGER & Sons Co., Chicago, Ill.
(See page 201.)

WILKENS Co., Wm., Frederick Ave. & Wilkens St., Baltimore, Md.

WOLL & Co., F. P., Church & Tacony Sts. (Frankford), Philadelphia, Pa.

WOLL & Sons Mfg. Co., Peter, Hancock & Berks Sts., Philadelphia, Pa.

HAMPERS

TOURING HAMPERS, BASKETS AND LUNCH BOXES

(See also Trunks, Automobile)

AMESBURY Reed & Rattan Co., Bailey Rldg., Amesbury, Mass.

BUBECK & Guerin, 161-63 W. 18th St., New York, N. Y. "Easypack."

BURLINGTON Basket Works, 600 N. Main St., Burlington, Ia. "Hawkeye."

EASYPACK—See Bubeck & Guerin.

HAWKEYE—See Burlington Basket Works.

HEYWOOD Bros. & Wakefield Co., 174 Portland St., Boston, Mass.

SEITZ, C., 275 W. 128th St., New York, N. Y.

WAL-RIKE Pony Vehicle Co., St. Paris, O.

HANDLES

DOOR HANDLES

AETNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMERICAN Ring Co., 531 Bank St., Waterbury, Conn.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

BRAINERD Mfg. Co., East Rochester, N. Y.

COWLES & Co., C., New Haven, Conn.
(See page 463.)

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 203.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

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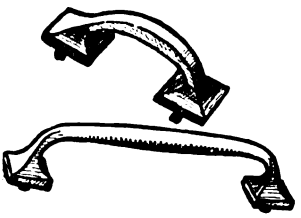
Something New For Your Car



Benedict Nickel Hood Fittings

Just what you need to replace your iron and brass nickel plated fittings. A solid white metal fitting, of which there is no nickel plate to wear off and no iron to rust. Just what you need to keep your car bright and new. Also get your nickel plated parts made of BENEDICT NICKEL and always have the sterling appearance of a new car. Write about these for prices to

JAMES GRAHAM & COMPANY

BRASS FOUNDERS

293 WOOSTER STREET *Est. 1861* NEW HAVEN, CONN.

SULZBERGER'S STERILIZED CURLED HAIR

AUTOMOBILE UPHOLSTERY DE LUXE

FOR

AUTOMOBILES—FURNITURE—MATTRESSES

ECONOMICAL—DURABLE—RESILIENT—SANITARY

Sulzberger's Sterilized Curled Hair goes farthest.

It is properly seasoned before it is permitted to leave our factory. Offers maximum qualities of resiliency. Holds its curl and vitality permanently.

Sulzberger's Sterilized Curled Hair can be furnished in all grades, in any color, for any purpose. Send us your specifications. Samples of hair will be cheerfully submitted.

"Sulzberger's"—the standard by which all other curled hair is measured.

SULZBERGER & SONS COMPANY, CHICAGO, ILL.

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HANDLES (Continued)

DOOR HANDLES (Continued)

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

LAW Engineering & Specialty Mfg. Co., Rochester, N. Y.

MERRIMAC Specialty Mfg. Co., Merrimac, Mass.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

PHOENIX Lock Works, 321-27 Third Ave., Newark, N. J.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

ROSTAND Mfg. Co., Milford, Conn.

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

STARTING CRANK HANDLES

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

HELLENBERG Co., J. B., Jefferson & Clark Sts., Coldwater, Mich.

LUZERNE Rubber Co., Trenton, N. J.

MECHANICAL Rubber Co., C. P. & Nickel Plate R. R., Cleveland, O.

STOKES Rubber Co., Jos., Trenton, N. J.

HANGERS

HAT HANGERS

(Clip for hanging hats on robe rails—See also Racks Hat)

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

LICENSE HANGERS

(See Holders, License; also Numbers, License)

PRESSED STEEL STEP HANGERS

BOSSERT Co., Utica, N. Y.
(See page 217.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 365.)

CROSBY Co., Buffalo, N. Y.
(See page 539.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 219.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O.
(See page 157.)

PARISH Mfg. Co., Reading, Pa.
(See page 483.)

ROCHESTER Pressed Steel Co., 16 Commercial St., Rochester, N. Y.

HASSOCKS

AUTOMOBILE HASSOCKS

(For Metal Foot Rests—See Rests, Foot)

CHICAGO Hassock Co., 1731 S. State St., Chicago, Ill.

HEADLIGHTS

ACETYLENE HEADLIGHTS

(See Lamps, Acetylene)

ELECTRIC HEADLIGHTS

(See also Lamps, Electric)

ADAMS-BAGNALL Electric Co., Cleveland, O.

APELCO—See Apple Electric Co.

APPLE Electric Co., Newark, N. J. "Apelco."

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J."
(See page 229.)

ESTERLINE Co., 228 E. South St., Indianapolis, Ind. "Golden Glow."

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GOLDEN GLOW—See Esterline Co.

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAMMER Co., E. A., 1839 Euclid Ave., Cleveland, O.

HOFACKER Mfg. Co., 555 W. 42d St., New York, N. Y.
(See page 205.)

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HEATERS

AUTOMOBILE HEATERS

(See also Gloves, Electrically Heated; also Wheels, Heated Steering)

AMERICAN Auto-Heater Co., 160 14th St., Buffalo, N. Y.

AMERICAN Electric Co., State & 64th Sts., Chicago, Ill.

AUTO Heater Co. of America, 1148 Bedford Ave., Brooklyn, N. Y. "Four-in-One."

CHICAGO Flexible Shaft Co., 608 La Salle Ave., Chicago, Ill. "Duchess." "Clark."

CINCINNATI Auto Heater Mfg. Co., Liberty & Clay Sts., Cincinnati, O.

CLARK—See Chicago Flexible Shaft Co.

DETROIT Auto Heater Co., Detroit, Mich.

DUCHESS—See Chicago Flexible Shaft Co.

FOUR-IN-ONE—See Auto Heater Co. of America.

GARRISON—See Standard Automobile Specialties Co.

GAS Saver Sales Co., 1790 Broadway, New York, N. Y. "Harback."

HARBACK—See Gas Saver Sales Co.

K. P. Foot Rest Heater Co., 210 S. 17th St., Philadelphia, Pa.

LEHMAN Bros., 10 Bond St., New York, N. Y. "Queen." "Star."

LYTLE Auto Heater Co., Memphis, Tenn.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radio."
(See page 445.)

PEERLESS Radiator Co., Gibbs, Idaho.

QUEEN—See Lehman Bros.

RADIO—See Milwaukee Auto Specialty Co.

STANDARD Automobile Specialties Co., 1324-26 Melon St., Philadelphia, Pa. "Garrison."

STAR—See Lehman Bros.

FEED WATER HEATERS

NATIONAL Pipe Bending Co., River & Lloyd Sts., New Haven, Conn.

OFELDT & Sons, F. W., Nyack, N. Y.

MIXTURE HEATERS

(For heating mixture in Carbureter or Manifold to facilitate starting)

ARNOLD Electric Co., 93 Mass. Ave., Boston, Mass.

CRONE, F. G., 334 Genesee St., Buffalo, N. Y.

NATIONAL Automobile Equipment Co., Industrial Bldg., Indianapolis, Ind.

STAATS & Co., Geo., 252 Lorimer St., Brooklyn, N. Y. "Stalit."

STALIT—See Staats & Co.

TATE—See United Motor Equipment Co.

UNITED Motor Equipment Co., 19 S. La Salle St., Chicago, Ill. "Tate."

VOLCANO Electric Primer Works, Virginia, Ill.

RADIATOR HEATERS

(For keeping radiators from freezing)

CONSOLIDATED Car Heating Co., Singer Bldg., New York, N. Y.

NEVEROUT—See Rose Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

HINGES

CABINET HINGES

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

STANLEY Works, New Britain, Conn.

YALE & Towne Mfg. Co., 9 E. 40th St., New York, N. Y.
(See page 243.)

DOOR HINGES

AETNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

BRAINERD Mfg. Co., East Rochester, N. Y.

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 205.)

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

EUREKA—See Parsons Mfg. Co.

GEM—See Parsons Mfg. Co.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

MERRIMAC Hinge Co., Merrimac, Mass.

MONARCH—See Parsons Mfg. Co.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

PARSONS Mfg. Co., 21st & Fort Sts., Detroit, Mich. "Gem," "Monarch," "Eureka."

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

SOSS Mfg. Co., 435-43 Atlantic Ave., Brooklyn, N. Y.

STANLEY Works, New Britain, Conn.

WAINWRIGHT & Son, W. W., 16th St. & Western Ave., Connersville, Ind.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

HOOD HINGES

A-Z Co., 530 W. 56th St., New York, N. Y.

BRONSON Co., Homer D., Beacon Falls, Conn.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O.

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No-Lining Dash and Tail Lamp

The No-Lining lamp is made for either the dash or rear light. It is an extremely compact lamp, having no lining and equipped with oil fount which cannot rattle or drop out. Manufactured of heavy gauge brass and fur-

No-lining dash and tail lamp.

nished with flat or round brackets as desired. Finished in either black and brass, black and nickel and all black. The same lamp is furnished with two white lenses for the dash. Also manufactured in combination oil and electric.

We are also manufacturers of all kinds of gas and electric automobile lamps together with oil lamps.

Manufactured by

THE HOFACKER MFG. COMPANY

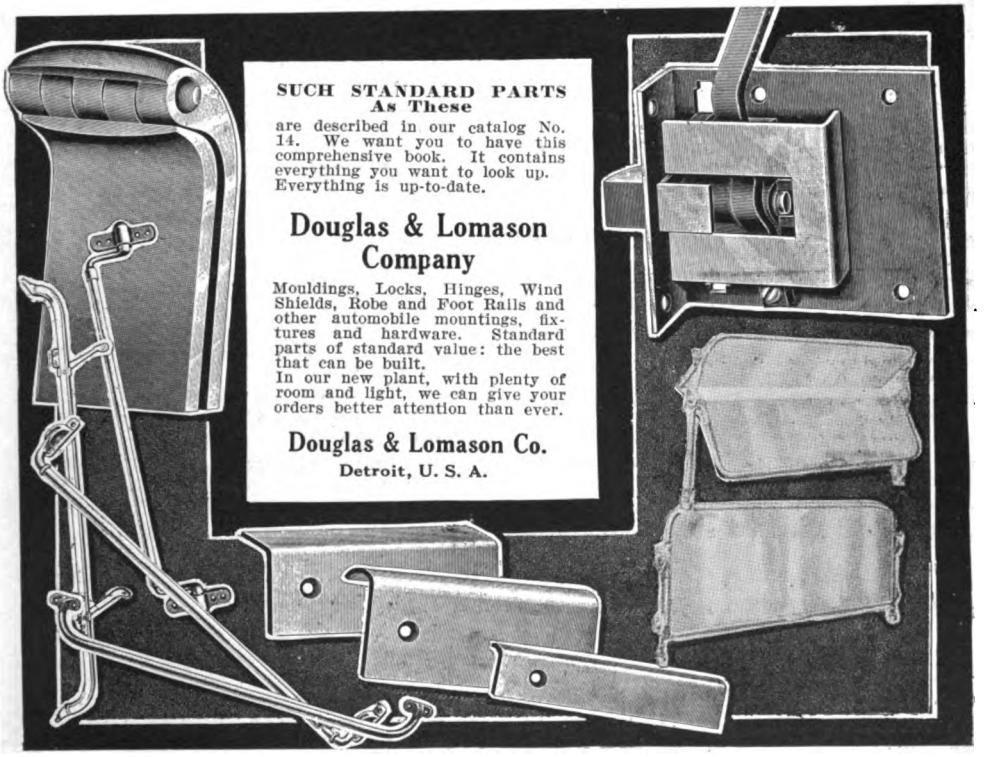
555 West 42nd Street, New York City

IN LOOKS AND TEST, BY FAR THE BEST.

B. & L. Auto Lamp Co.

507-509 WEST 35th STREET

NEW YORK



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HINGES (Continued)

HOOD HINGES (Continued)

SMITH & Co., Jos. N., Detroit, Mich. (See page 203.)

WATERBURY Brass Goods Corp., 160 Washington Ave., Waterbury, Conn.

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

HOISTS

PORTABLE HOISTS

(See Cranes, Portable)

HOLDERS

BATTERY HOLDERS

(See also Boxes, Battery)

BECCO—See Michigan Motor Specialties Co.

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Hermetic."

HERMETIC—See Campbell Co.

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco." (See page 139.)

PATTERSON—See Stanley & Patterson.

STANLEY & Patterson, 23 Murray St., New York, N. Y. "Patterson."

BOUQUET HOLDERS

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.)

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

GOODWIN & Kintz Co., Winsted, Conn.

HAWKES & Co., T. G., Corning, N. Y.

INTERNATIONAL Silver Co., Meriden, Conn.

LAW Engineering & Specialty Mfg. Co., Rochester, N. Y.

LIBERTY Cut Glass Works, Egg Harbor City, N. J. (See page 207.)

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

STEUBEN Glass Works, Corning, N. Y.

WATSON Co., Mechanics St., Attleboro, Mass.

FLAG, PENNANT AND EMBLEM HOLDERS

ALUMINUM Goods Mfg. Co., Manitowoc, Wis.

BON Tour Mfg. Co., Cobleskill, N. Y.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

J. & J. Mfg. Co., 192 Piquette Ave., Detroit, Mich. "Universal."

LEYMAN-BUICK Co., 630 Walnut St., Cincinnati, O.

UNIVERSAL—See J. & J. Mfg. Co.

LICENSE HOLDERS

ALL-AND-CO., Springfield, Mass. "Allen."

ALLEN—See All-And-Co.

APCO—See Auto Parts Co.

AUTO Parts Co., 702 Eddy St., Providence, R. I. "Apco."

AUTOMOBILE License Indicator Co., Lewisburg, Tenn. "Perfection." "Standard."

BALZER Co., Gus, 1777 Broadway, New York N. Y.

BELMONT—See Standard Auto-Equipment Co.

BOSTON—See Phillips, Fordham.

BROOKS & Sons, M. S., Chester, Conn.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CORNELIUS Auto Sales Co., 809 Jefferson Ave., Toledo, O. "Perfect."

DAYTON Malleable Iron Co., Dayton, O.

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

GRAFFAM, W. S., Northampton, Mass. "Nobby."

HALLADAY Co., L. P., Streator, Ill.

KISKI Novelty Co., Leechburg, Va.

LEE Co., Wm. O., Port Huron, Mich. (See page 111.)

LEYMAN-BUICK Co., 630 Walnut St., Cincinnati, O.

MASCO—See Milwaukee Auto Specialty Co.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco." (See page 445.)

NEVEROUT—See Rose Mfg. Co.

NOBBY—See Graffam, W. S.

PERFECT—See Cornelius Auto Sales Co.

PERFECTION—See Automobile License Indicator Co.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. (See page 48.)

PHILLIPS, Fordham (Allston), Boston, Mass. "Boston."

REED Co., 390 Main St., Mayfield, Cal.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

SECURITY Co., 30 Shingiss St., Pittsburg, Pa.

STAFFORD Auto Lamp & Number Co., 1475 Michigan Ave., Chicago, Ill.

STANDARD—See Automobile License Indicator Co.

STANDARD Auto-Equipment Co., 4947 Fairmount Ave., Philadelphia, Pa. "Belmont."

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

WHITEHOUSE Lecompte Mfg Co., 42-54 Elm St., Newark, N. J. (See page 509.)

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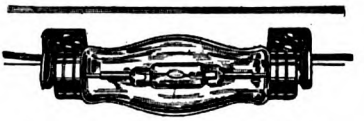
NEW MODELS

LIBERTY CUT GLASS Non-splashable Automobile Vases and Lamps

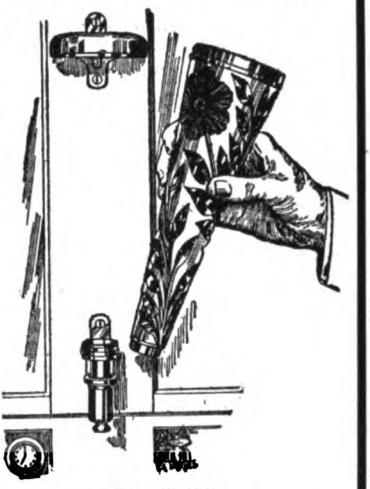
No. 566-282



An inexpensive, but practical Touring Car Lamp, easily removed for folding of top.
Also Closed Body Corner Lamps, with or without Switch.
Made in any voltage.

Glass parts, cut lead glass, metal parts made of bronze, all finishes, as well as Solid German Silver.

Send for free catalog.



No. 491-282

LIBERTY CUT GLASS WORKS

Manufacturers of Cut Glass Wares, Metal Specialties, Artistic Glass and Metal Lighting Fixtures

EGG HARBOR CITY NEW JERSEY

The ALLEN TIRE CASE is made of finest quality enamel duck, absolutely waterproof. It gives perfect protection to the spare shoe. Made in all colors, in all sizes and for all style demountable rims and wire wheels.

Lamp Covers
Tool Box Covers
Trunk Covers
Radiator Covers
Inner Tube Bags
Knuckle Boots
Tire Locks
Tire Holders

bearing the name "Allen" are guaranteed highest quality and finest workmanship.

Tire Pressure Gauges are a motoring necessity and all dealers should carry in stock the absolutely accurate and convenient

The Allen Auto Specialty Co.
1926 Broadway New York
1627 Michigan Ave., Chicago.

ALLEN TYROMETER
TIRE PRESSURE GAUGE

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HOLDERS (Continued)

OIL CAN HOLDERS

BECCO—See Michigan Motor Specialties Co.

BUFFUM Tool Co., Louisiana, Mo.

DAYTON Malleable Iron Co., Dayton, O.

HALLADAY Co., L. P., Streator, Ill. "Reliable."

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill. "Security."

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco."
(See page 139.)

RELIABLE—See Halladay Co.

SECURITY—See Mayo Mfg. Co.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

STARTING CRANK HOLDERS

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

CAMPBELL—See Perkins-Campbell Co.

CARTER Co., George R., 1600-20 Kentucky Ave., Connersville, Ind.

ECONOMY Stay Co., Jefferson City, Mo.

FEESER Co., Frank S., 1102 Prospect St., Indianapolis, Ind. "Superior."

G & K—See Graton & Knight Mfg. Co.

GILBERT Mfg. Co., New Haven, Conn.

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K."
(See page 67.)

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HAWES Storm Front Co., 14 N. Monroe St., Coldwater, Mich.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

HOOVER Co., W. H., New Berlin, O.

KING Specialty Mfg. Co., 207 Washington St., Brookline, Mass.

NATHAN Novelty Mfg. Co., 906 Reade St., New York, N. Y.
(See page 347.)

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

NORTHERN Specialty Co., Ford Bldg., Detroit, Mich.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell."
(See page 48.)

REINHOLD Belting & Supply Co., 499 Atlantic Ave., Brooklyn, N. Y.

SPECIALTY Harness Co., Dayton, Va.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

SUPERIOR—See Feeser Co.

TIRE HOLDERS

(For carrying spare tires on cars)

ACME—See Cox Brass Mfg. Co.

ACME—See Garage Equipment Mfg. Co.

AETNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

ALDING—See Alsten & Goulding Co.

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y.
(See page 207.)

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMCO—See Chicago Electric Mfg. Co.

AMERICAN Ring Co., 531 Bank St., Waterbury, Conn.

ATLAS—See Garage Equipment Mfg. Co.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

AUTO Brass Mfg. Co., 56 Friendship St., Providence, R. I.

AUTO Parts Mfg. Co., Jackson & Michigan Sts., Milwaukee, Wis. "Badger."

BADGER—See Auto Parts Mfg. Co.

BANNER—See Garage Equipment Mfg. Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Monarch."

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

CLEVELAND Hardware Co., Cleveland, O.

COX Brass Mfg. Co., Albany, N. Y. "Monarch," "Duplex," "Acme."
(See page 511.)

DAYTON Malleable Iron Co., Dayton, O.

DETLOFF, A. J., 121 Champlain St., Detroit, Mich.

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 205.)

DUPLEX—See Cox Brass Mfg. Co.

DUPLEX—See Garage Equipment Mfg. Co.

E.-C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

EUREKA—See Garage Equipment Mfg. Co.

EXCELSIOR—See Garage Equipment Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Acme," "Banner," "Duplex," "Eureka," "Gemco," "Hercules," "Ideal," "Milwaukee," "Premier," "Simplex," "Standard," "Superior," "Sampson," "Atlas," "Excelsior," "Reliable."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

GILBERT Mfg. Co., New Haven, Conn.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn.
(See page 201.)

HALLADAY Co., L. P., Streator, Ill. "Reliable."

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HERCULES—See Garage Equipment Mfg. Co.

HERCULES—See Western Brass Mfg. Wks.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IDEAL—See Garage Equipment Mfg. Co.

Complete Index to Classification appears on Pages 8 to 26.

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ATTWOOD BRASS WORKS

Manufacturers of

TIRE HOLDERS, ROBE RAILS, FOOT RESTS
BODY HARDWARE, TANK & RADIATOR FITTINGS.
SPECIAL WORK.

Catalog E on request.
New supplement just issued.

Scribner Ave. and Bowery St. GRAND RAPIDS, MICH.

Adlake Electric System

furnishes current for all lamps and keeps batteries charged automatically
USED ON PIERCE-ARROW AND LOCOMOBILE CARS

Adlake Lamps

combination oil and electric, with INSIDE oil pot

THE engineering features of our material warrant careful investigation.

Our trade mark ADLAKE has become synonymous with BEST in the minds of careful automobile manufacturers.

We have been in the manufacturing business over fifty years.

THE ADAMS & WESTLAKE CO. NEW YORK, CHICAGO PHILADELPHIA

THE VICTOR

GREASE GUN
PAT. APPL'D FOR

EASILY FILLED, as its cylinder measures 3" in Diameter.

HOLDS TWO LBS. OF GREASE, sufficient for any Transmission.

WORKS WITH AIR PRESSURE, and only needs two strokes of our VICTOR PUMP to discharge the two lbs. of grease in THREE SECONDS.

All can now do this hitherto dirty, disagreeable work.

Saving 7/8ths of the time,

Saving soiling hands,

Saving soiling clothes.

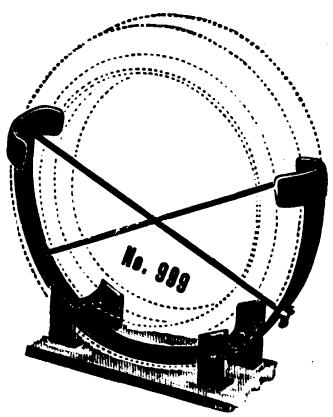
We will send any responsible dealer one on thirty days' trial.

Write Now.

Judd & Leland Mfg. Co.
Clifton Springs, N. Y.

FORD TIRE CARRIERS

Running Board Complete with Belts no Straps Required



REAR complete with Lamp and License Pad Holders.
Also Lock, no straps required.
Clear of Exhaust Pipe.
Attached in 10 minutes.

LoCompto Co.
65 Murray Street
New York

No. 1

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HOLDERS (Continued)

TIRE HOLDERS (Continued)

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

LE COMPTE Co., 65 Murray St., New York, N. Y.
(See page 209.)

MASCO—See Milwaukee Auto Specialty Co.

MEDINA Stamping & Machine Co., Medina, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MILLER Hardware Co., T. T., 30-32 N. Fourth St., Easton, Pa.

MILWAUKEE—See Garage Equipment Mfg. Co.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco."
(See page 445.)

MONARCH—See Beckley-Ralston Co.

MONARCH—See Cox Brass Mfg. Co.

MOTOR Patents Co., Dime Bank Bldg., Detroit, Mich. "Pervin."

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PERVIN—See Motor Patents Co.

PREMIER—See Garage Equipment Mfg. Co.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

RELIABLE—See Garage Equipment Mfg. Co.

RELIABLE—See Halladay Co.

RIMOLOX Tire Carrier Co., 1501-21 E. Illinois St., Evansville, Ind.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J.

SAMPSON—See Garage Equipment Mfg. Co.

SIMPLEX—See Garage Equipment Mfg. Co.

SJOHOLM, N. P., 11 Westmoreland Pl., St. Louis, Mo.

SLY Mfg. Co., W. W., Cleveland, O.

SMITH, H. Lund, 199-203 Paterson St., Paterson, N. J.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

STANDARD—See Garage Equipment Mfg. Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

SUNDERLAND Mfg. Co., 61 E. 24th St., Chicago, Ill.

SUPERIOR—See Garage Equipment Mfg. Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. "Hercules."
(See page 327.)

WHITEHOUSE Lecompte Mfg. Co., 42-54 Elm St., Newark, N. J.
(See page 509.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

TOP HOLDERS

APPLAS Mfg. Co., 922 Fifth Ave., Moline, Ill.

AUTO Specialties Mfg. Co., 306 Fisher Bldg., Chicago, Ill. "Bair."
(See page 347.)

BAIR—See Auto Specialties Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WATCH HOLDERS

(See also Clocks, Dashboard)

ADAMS Co., Henry T., 6828 S. Chicago Ave. Chicago, Ill. "Quick Action."

ANCHOR—See Metal Specialties Mfg. Co.

BURLEIGH, Geo. K., Penacook, N. H.

CALDWELL & Co., H. S., 74 Cortlandt St., New York, N. Y. "Readwell."

COWLES & Co., C., New Haven, Conn.
(See page 463.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

GOODWIN & Kintz Co., Winsted, Conn.

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Anchor."

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn.
(See page 321.)

QUICK ACTION—See Adams Co.

READWELL—See Caldwell & Co.

SIMPLEX—See Sterling Mfg. Co.

STERLING Mfg. Co., Staunton, Va. "Simplex."

HOODS

MOTOR HOODS

A-Z Co., 530 W. 56th St., New York, N. Y.

BRISCOE Mfg. Co., Detroit, Mich.

BRISKIN Mfg. Co., 539 N. Capitol Ave., Indianapolis, Ind.

BUNN-HUTCHINSON Co., 2074 E. 22d St., Cleveland, O.

BUSH Mfg. Co., Hartford, Conn.
(See page 363.)

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

EUREKA Auto Parts Mfg. Co., 1915 Pine St., St. Louis, Mo.

FORSYTH Bros. Co., Harvey, Ill.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

HARTFORD Sheet Metal Works, 325 N. Front St., Hartford, Conn.

HAYES Mfg. Co., Detroit, Mich.

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of the better grade in GUN METAL, ALUMINUM, PHOSPHOR BRONZE, or MANGANESE BRONZE.

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for machines where quality and accuracy are required.

We finish parts with less variation than most machine shops.

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Indianapolis, Indiana

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HOODS (Continued)

MOTOR HOODS (Continued)

JOHNSON'S Automobile Sheet Metal Works, W. N., 620-28 South J St., Richmond, Ind.

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y.
(See page 199.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KINSEY Mfg. Co., Toledo, O. "Kinwood."

KINWOOD—See Kinsey Mfg. Co.

LAWSON Co., F. H., Cincinnati, O.

LONG MFG. Co., Detroit, Mich.
(See page 323.)

MAYO Radiator Co., New Haven, Conn.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE Pressed Steel Co., East Moline, Ill.

PARAGON Auto-Parts Mfg. Co., 506 W. 53d St., New York, N. Y.

PERFEX Radiator Co., Racine, Wis.

R. & H. Sheet Metal Co., Abington, Mass.

REID Co., 1603 Second Ave., Moline, Ill.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 71.)

SUSSMAN & Rosenberg Mfg. Co., M., Tarrytown, N. Y.

TODD Mfg. Co., 820-24 Mary Pl., Minneapolis, Minn.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

HOOKS

SNAP HOOKS

ANCHOR—See North & Judd Mfg. Co.

COVERT Mfg. Co., Troy, N. Y.

FRAZER & Jones Co., Syracuse, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NORTH & Judd Mfg. Co., New Britain, Conn. "Anchor."

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

HORNS

BULB HORNS

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y. "Maxim."

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

MAXIM—See Automobile Supply Mfg. Co.

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

STANDARD Metal Mfg. Co., Newark, N. J.
(See page 213.)

SUPERIOR Lamp Mfg. Co. 136 W. 52d St., New York, N. Y.

ELECTRIC HORNS AND HORN BLOWERS

ADAMS-BAGNALL Electric Co., Cleveland, O.

AMERICAN Brass Products Co., Hartford, Conn. "Volier."

AMERICAN Electric Co., State & 64th Sts., Chicago, Ill. "Samson," "Victor."

APOLLO—See Automobile Supply Mfg. Co.

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y. "Newtone," "Electra," "Apollo."

BENJAMIN Electric Mfg. Co., 120 S. Sangamon St., Chicago, Ill.

CLERO—See Fitzgerald Mfg. Co.

DEAN Auto Devices Co., 120 S. Sangamon St., Chicago, Ill. "Fordorn."

DIXIE—See Edwards & Co.

DUPLEX Electric Mfg. Co., 6112 Station St., Pittsburg, Pa. "Safeguard."

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y. "Dixie."

ELECTRA—See Automobile Supply Mfg. Co.

ELECTRIC Horn & Specialty Co., 119 Columbia St., Utica, N. Y. "Oneita."

ELECTRIC Spark Appliance Co., 140-62 Imlay St., Brooklyn, N. Y. "Olympic."

FITZGERALD Mfg. Co., Torrington, Conn. "Clero."
(See page 213.)

FORDORN—See Dean Auto Devices Co.

FRANKFORT—See Utica Steam Gauge Co.

GARFORD Mfg. Co., 2515 Taylor St., Elyria, O. "Tuto," "Tutoette," "Rexo."

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HEINZE Electric Co., Lowell, Mass.
(See page 499.)

HI-LO—See Premier Electric Co.

HOLTZER-CABOT Electric Co., Brookline, Mass. "Reacto."

INTER-STATE Machine Co., New London, Conn. "Sterling."

KA-HA-CO—See Kales-Haskel Co.

KALES-HASKEL Co., 441-53 Lafayete Blvd. Detroit, Mich. "Ka-Ha-Co."

KLAXET—See Lovell-McConnell Mfg. Co.

KLAXON—See Lovell-McConnell Mfg. Co.

Complete Index to Classification appears on Pages 8 to 26.

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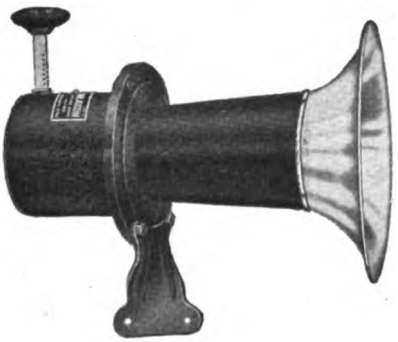

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It is the most efficient, reliable and the loudest horn manufactured today.

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Black and Brass
All Black.

Manufactured By
The Fitzgerald Mfg. Co. Torrington, Conn.

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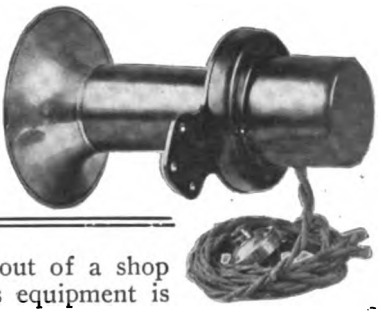
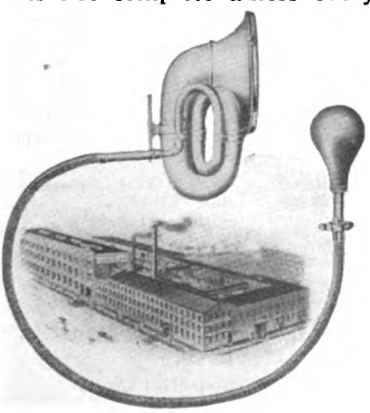


The best designed car that ever came out of a shop is not complete unless every detail of its equipment is of the best.



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NEWARK, NEW JERSEY

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HORNS (Continued)

ELECTRIC HORNS AND HORN BLOWERS (Continued)

KLAXONET—See Lovell-McConnell Mfg. Co.

LOVELL-McCONNELL Mfg. Co., Newark, N. J. "Klaxon," "Klaxonet," "Klaxet." (See page 213.)

NEWTONE—See Automobile Supply Mfg. Co.

NONPAREIL Horn Mfg. Co., 78-75 Wooster St., New York, N. Y.

O'BRIEN Electrophone Co., Hallowell, Me.

OLYMPIC—See Electric Spark Appliance Co.

ONEITA—See Electric Horn & Specialty Co.

PREMIER Electric Co., 4032-42 W. Ravenswood Ave., Chicago, Ill. "Hi-Lo," "Repello."

REACTO—See Holtzer-Cabot Electric Co.

RAPID FIRE—See Russell Electric Co.

REPELLO—See Premier Electric Co.

REXO—See Garford Mfg. Co.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

RUSSELL Electric Co., Danbury, Conn. "Saxon," "Rapid Fire," "Saxonette."

SAFEGUARD—See Duplex Electric Mfg. Co.

SAMSON—See American Electric Co.

SAXON—See Russell Electric Co.

SAXONETTE—See Russell Electric Co.

SIRENO Co., 18-20 Rose St., New York, N. Y.

SPARKS-WITHINGTON Co., Jackson, Mich. "Sparton."

SPARTON—See Sparks-Withington Co.

STANDARD Metal Mfg. Co., Newark, N. J. (See page 213.)

STERLING—See Inter-State Machine Co.

SUPERIOR Lamp Mfg. Co., 136 W. 52d St., New York, N. Y.

TUTO—See Garford Mfg. Co.

TUTOETTE—See Garford Mfg. Co.

TYPHOON Signal Co., N. Chicago St., Lincoln, Ill.

UTICA Steam Gauge Co., Frankfort, N. Y. "Frankfort."

VICTOR—See American Electric Co.

VOLIER—See American Brass Products Co.

WARNER Electric Co., Walnut & 20th Sts., Muncie, Ind.

EXHAUST HORNS

(Tube Horns or Chimes and Whistles)

AERMORE—See Fulton Co.

AHCO—See Arnold-Hough Co.

AMCO—See Chicago Electric Mfg. Co.

APCO—See Auto Parts Co.

ARNOLD-HOUGH Co., 124 Washington St., Providence, R. I. "Ahco."

AUTO Equipment Mfg. Co., 18 Pearl St., Newton, Mass.

AUTO PARTS Co., 702 Eddy St., Providence, R. I. "Apco."

AUTOCHIME—See Gray-Hawley Mfg. Co.

AUTOLARM—See Gray-Hawley Mfg. Co.

BARCO Brass & Joint Co., 212-22 W. Illinois St., Chicago, Ill.

BIG Four Horn Co., Watseka, Ill.

BLAZER—See Motor Specialties Co.

BONNER Co., D. Henry, 96 Plympton St., Cambridge, Mass. "Tremo."

CAMPBELL Mfg. Co., 3715 Wentworth Ave., Chicago, Ill. "Harkaway."

CHICAGO Electric Mfg. Co., 523-29 Van Buren St., Chicago, Ill. "Amco."

CLIMAX Electric Works, New Salem, Mass.

COMING Mfg. Co., Railway Exchange Bldg., Chicago, Ill. "Trinity."

EMPIRE—See S. B. R. Specialty Co.

EXO—See Troy Auto Specialty Co.

F. A. M. Auto Supply Co., 698 Main St., Buffalo, N. Y.

FOGG—See Motor Specialties Co.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill. "Howler."

FULTON Co., 726 National Ave., Milwaukee, Wis. "Aermore."

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Melody," "Superior." (See page 87.)

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich. "Autochime," "Autolarm."

HARKAWAY—See Campbell Mfg. Co.

HOWLER—See Fowler Lamp & Mfg. Co.

INTERNATIONAL Automobile Supply Co., 117 W. South Water St., Chicago, Ill. "Victor."

JERICHO—See Randall-Faichney Co.

JUBILEE—See Randall-Faichney Co.

MELODY—See Garage Equipment Mfg. Co.

MINERVA Hardware Mfg. Co., Minerva, O.

MOTOR Specialties Co., Waltham, Mass. "Blazer," "Fogg."

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 539.)

NIGHTINGALE—See Riley-Klotz Mfg. Co.

PROVIDENT Motor Supply Co., 515 N. Broad St., Philadelphia, Pa. "Red Devil."

RANDALL-FAICHNEY Co., Boston, Mass. "Jericho," "Jubilee."

RED DEVIL—See Provident Motor Supply Co.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J. "Nightingale."

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Empire."

SCREAM Sales Co., 2724 Michigan Ave., Chicago, Ill.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

SUPERIOR—See Garage Equipment Mfg. Co.

TREMO—See Bonner Co.

TRINITY—See Coming Mfg. Co.

TROY Auto Specialty Co., Troy, N. Y. "Exo."

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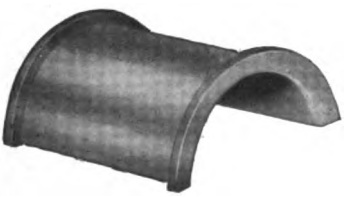

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HORNS (Continued)

EXHAUST HORNS (Continued)

VICTOR—See International Automobile Supply Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

MECHANICAL HORNS

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y. "Motophone," "Cablephone."

CABLEPHONE—See Automobile Supply Mfg. Co.

CULMER Engineering Co., 6 Church St., New York, N. Y. "Reliance."

ELECTRIC Spark Appliance Co., 140-62 Imlay St., Brooklyn, N. Y. "Olympic."

KLAXON—See Lovell-McConnell Mfg. Co.

LOVELL-McCONNELL Mfg. Co., Newark, N. J. "Klaxon."
(See page 213.)

M-L—See Miller-Lovatt Co.

MILLER-LOVATT Co., Weatherly, Pa. "M-L."

MOTOPHONE—See Automobile Supply Mfg. Co.

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y. "Pilot."

OLYMPIC—See Electric Spark Appliance Co.

OVER-TONE—See Overholt Co.

OVERHOLT Co., S. Henderson & Fourth Sts., Galesburg, Ill. "Over-Tone."

PIEL Co., G., 13th St. & Boulevard. Long Island City, N. Y.

PILOT—See Nonpareil Horn Mfg. Co.

RELIANCE—See Culmer Engineering Co.

ROCHESTER Mfg. Co., 347 Blossom Rd., Rochester, N. Y.

SPARKS-WITHINGTON Co., Jackson, Mich. "Sparton-Echo."

SPARTON-ECHO—See Sparks-Withington Co.

STEWART-WARNER Speedometer Corp., 1904 Diversey Blvd., Chicago, Ill.
(See page 365.)

TALKING Horn Co., Middletown, N. Y.

SIREN HORNS

INTER-STATE Machine Co., New London, Conn. "Sterling."

O'BRIEN Electrophone Co., Hallowell, Me.

SIRENO Co., 18-20 Rose St., New York, N. Y.

STERLING—See Inter-State Machine Co.

HOSE

RUBBER HOSE

ACME Rubber Mfg. Co., Trenton, N. J.

BOSTON Belting Co., 84 Linden Park St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 139.)

CLEVELAND—See Mechanical Rubber Co.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Works, Erie, Pa.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

GOODRICH Co., B. F., Akron, O.

HAMILTON Rubber Mfg. Co, Trenton, N. J.
(See page 425.)

HIDE, Leather & Belting Co., Indianapolis, Ind.
(See page 69.)

HOME Tire Co., Trenton, N. J.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O. "Cleveland."

MILFORD Rubber Works, Milford, Ill.

MINERALIZED Rubber Co., 165 Chambers St., New York, N. Y.

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

NEW York Rubber Co., 84 Reade St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REPUBLIC Rubber Co., Youngstown, O.

THERMOID Rubber Co., Trenton, N. J.
(See page 55.)

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.
(See page 355.)

WHITEHEAD Bros. Rubber Co., Trenton, N. J.

WOVEN Steel Hose & Rubber Co., Trenton, N. J.
(See page 531.)

HOUSINGS

PRESSED STEEL AXLE HOUSINGS

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 217.)

CROSBY Co., Buffalo, N. Y.
(See page 539.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 219.)

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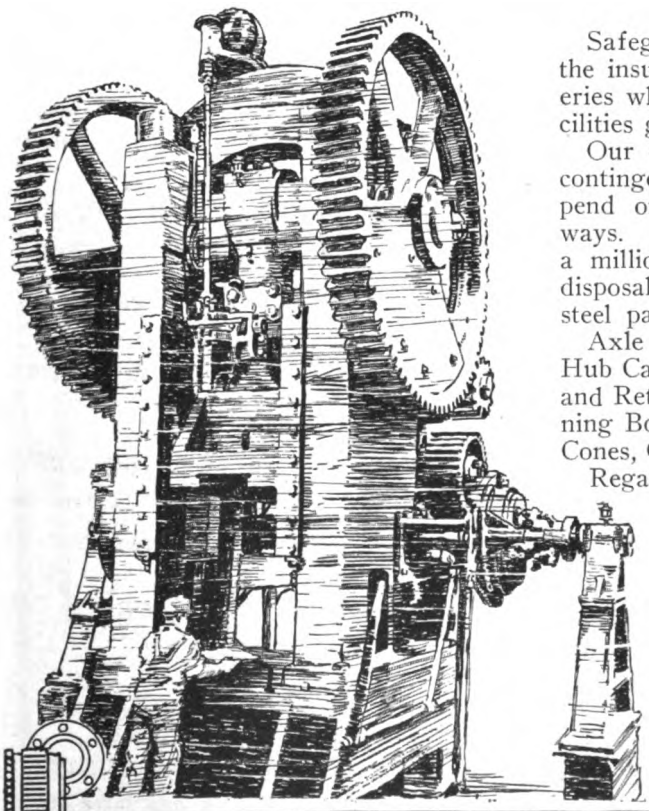
Pressed Metal Goods for Automobiles



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Utica, New York

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HOUSINGS (Continued)

PRESSED STEEL AXLE HOUSINGS (Continued)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527)

PARISH Mfg. Co., Reading, Pa.
(See page 483.)

SMITH Co., A. O., Milwaukee, Wis.
(See page 373.)

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

HUBS

WHEEL HUBS

AMERICAN Ball-Bearing Co., Cleveland, O.
(See page 285.)

BOSSERT Co., Utica, N. Y.
(See page 217.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 219.)

JACKSON Drop Forging Co., Jackson, Mich.

KELSEY Wheel Co., Detroit, Mich.

METAL Products Co., Detroit, Mich.
(See page 485.)

MOTT Wheel Works, Utica, N. Y.
(See page 359.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 513.)

TIMKEN-DETROIT Axle Co., Detroit, Mich.

WALKER-WEISS Axle Co., Flint, Mich.

WESTON-MOTT Co., Flint, Mich.
(See page 51.)

HYDROMETERS

TESTING HYDROMETERS

(For testing Battery Electrolyte, Gasoline, etc.)

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

AUTOCRAT—See American Thermo Ware Co.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

FREEZOMETER—See Taylor Instrument Cos.

GENERAL Scientific Equipment Co., 2000 Market St., Philadelphia, Pa.

MARSHALL, Walter & Co., Milwaukee, Wis.

QUEEN-GRAY Co., 616-18 Chestnut St., Philadelphia, Pa.

SCHAEFFER & Budenberg Mfg. Co., 481 De Kalb Ave., Brooklyn, N. Y.

SIMPLEX Hydrometer Co., 314-20 Market St., Newark, N. J.

STORAGE Battery Supply Co., 239 E. 27th St., New York, N. Y.

TAGLIABUE Mfg. Co., C. J., Bush Terminal Bldg., Brooklyn, N. Y.

TAYLOR Instrument Cos., 95 Ames St., Rochester, N. Y. "Freezometer."

WEINHAGEN, H., 159-65 Leonard St., New York, N. Y.

INDICATORS

AUTOMOBILE SPEED INDICATORS

(See Speedometers)

DISTANCE OR MILEAGE INDICATORS

(See Meters, Distance)

GRADE INDICATORS

(See Meters, Grade)

SPARK INDICATORS

(See Gaps, Spark)

TAIL LIGHT INDICATORS

(Device to show when tail light goes out.)

BOSTON—See Harding Specialties Co.

CAMPBELL Mfg. Co., 3715 Wentworth Ave., Chicago, Ill. "Tell-Tale."

GUARANTEED Specialties Co., 588 Broad St., Newark, N. J.

HARDING Specialties Co., 755 Boylston St., Boston, Mass. "Boston."

TELL-TALE—See Campbell Mfg. Co.

INFLATORS

TIRE INFLATORS

(See Pumps; also Tanks)

INJECTORS

BOILER FEEDING INJECTORS

AMERICAN Injector Co., 173 14th Ave., Detroit, Mich.

PENBERTHY Injector Co., Detroit, Mich.

GREASE INJECTORS

(See Guns, Grease)

INSTRUMENTS

GAS ANALYSIS INSTRUMENTS

COAPCO—See Combustion Appliances Co.

COMBUSTION Appliances Co., 1775 Lunt Ave., Chicago, Ill. "Coapco."

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INSTRUMENTS (Continued)

GEAR TESTING INSTRUMENTS

FEICHT-BEVINGTON Mfg. Co., Cleveland, O.
(See page 503)

GLEASON Works, 1000 University Ave., Rochester, N. Y.

MOTOR TESTING INSTRUMENTS

(For locating knocks in motors)

AMERICAN Electric Co., State & 64th Sts., Chicago, Ill. "Sonoscope."

BOSTON Talking Machine Co., Ames & Amherst Sts., Cambridge, Mass. "Detectorphone."

DETECTORPHONE—See Boston Talking Machine Co.

HOPEWELL Bros., Newton, Mass. "Vibracator."
(See page 97.)

PILLING & Son Co., G. P., Arch & 23d Sts., Philadelphia, Pa. "Phonendoscope."

PHONENDOSCOPE—See Pilling & Son Co.

SONOSCOPE—See American Electric Co.

T. A. D.—See Toledo Auto Devices Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

VIBRACATOR—See Hopewell Bros.

RUBBER TESTING INSTRUMENTS

SHORE Instrument & Mfg. Co., 555-57 W. 22d St., New York, N. Y.

STEEL TESTING INSTRUMENTS

SCLEROSCOPE—See Shore Instrument & Mfg. Co.

SHORE Instrument & Mfg. Co., 555-57 W. 22d St., New York, N. Y. "Scleroscope."

INTENSIFIERS

SPARK INTENSIFIERS

(See Gaps, Spark)

IRONS

BODY OR TOP IRONS

ASHTABULA Bow Socket Co., Ashtabula, O.

BLAKESLEE Forging Co., Plantsville, Conn.

CLEVELAND Hardware Co., Cleveland, O.

CORTLAND Carriage Goods Co., 115 Pt. Watson St., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y.

COWLES & Co., C., New Haven, Conn.
(See page 463.)

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 365.)

DESOCO—See Detroit Socket Co.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

GENERAL Drop Forge Co., Buffalo, N. Y.
(See page 273.)

MICHIGAN Bolt & Nut Works, ft. Meldrum Ave., Detroit, Mich.

NEWTON & Son, W. H., 127 Elm St., Cortland, N. Y.

RANDS Mfg. Co., Holden & Lincoln Aves., Detroit, Mich.

SCHERER & Co., H., Detroit, Mich.

SLAT IRONS

(For Bow Sockets—See Sockets, Bow)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

COWLES & Co., C., New Haven, Conn.
(See page 463.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

TIRE IRONS

(See Tools, Tire)

JACKS

LIFTING JACKS

A. B. C.—See Motor Specialties Co.

AJAX—See Lennox Jack Works.

ALRITE—See National Jack & Mfg. Co.

ASHLAND Mfg. Co., Ashland, O. "Eureka," "Atlas," "Speeder."
(See page 223.)

ATLAS—See Ashland Mfg. Co.

BADGER—See Walker-Moore Mfg. Co.

BARRETT—See Duff Mfg. Co.

BARTH Mfg. Co., 74 L St., Milwaukee, Wis.
(See page 223.)

BATAVIA Clamp Co., 131 Center St., Batavia, N. Y. "Colts."

BUCKEYE Jack Mfg. Co., Alliance, O.

BUDA Co., Harvey, Ill.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHICAGO Jack & Supply Co., 175 W. Jackson Blvd., Chicago, Ill.

COLTS—See Batavia Clamp Co.

CROSBY Co., 2120 Vodeli St., Pittsburg, Pa.

DUFF Mfg. Co., Preble Ave., Pittsburg, (N. S.), Pa. "Barrett."

ELITE Mfg. Co., Ashland, O. "Reliable," "Ideal."

EUREKA—See Ashland Mfg. Co.

FARMER Mfg. Co., Brookside Pk., Cleveland, O.

GIANT—See S. B. R. Specialty Co.

HANSON, Henry L., 25 Union St., Worcester, Mass.

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U.S.

BALL BEARINGS

Why This Advertisement

WE hope to keep our name before the Ball Bearing consumer until such time as the opportunity arises for our product to demonstrate by its performance under the most crucial test, that our claims for superiority and 100% ball bearing efficiency are well founded.

Anti-friction—The title conceded to none other than a Ball Bearing.

U. S. Ball Bearing Mfg. Co.

U. S. made, for U. S. Trade

Main Office and Works, Oak Park, Ills.

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JACKS (Continued)

LIFTING JACKS (Continued)

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J.
(See page 353.)

IDEAL—See Elite Mfg. Co.

JOYCE-CRIDLAND Co., 329 S. Linden Ave., Dayton, O. "XX Century."

KAZOO—See National-Standard Co.

LEADER—See National-Standard Co.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O. "Little Giant."

LITTLE GIANT—See Lennox Jack Works.

LITTLE GIANT—See National Jack & Mfg. Co.

LITTLE GIANT—See Pratt Mfg. Co.

MOTOR Specialties Co., Waltham, Mass. "A. B. C."

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill. "Alrite," "Little Giant," "Starite."

NATIONAL-STANDARD Co., Niles, Mich. "Kazoo," "Standard," "Leader."
(See page 223.)

OLIVER Mfg. Co., 326 S. Desplaines St., Chicago, Ill. "Peerless."

PEERLESS—See Oliver Mfg. Co.

PERFECT—See Walker-Moore Mfg. Co.

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill. "Little Giant," "Pup."

PUP—See Pratt Mfg. Co.

RELIABLE—See Elite Mfg. Co.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Giant."

SHAWVER Co., rear 31 W. Pleasant St. Springfield, O. "Springfield."

SPEEDER—See Ashland Mfg. Co.

SPRINGFIELD—See Shawver Co.

STANDARD—See National-Standard Co.

STARITE—See National Jack & Mfg. Co.

TRIUMPH—See Walker-Moore Mfg. Co.

VAN—See Vanderpool Co.

VANDERPOOL Co., 723 W. Mulberry St., Springfield, O. "Van."

WALKER-MOORE Mfg. Co., 310 Walker St., Racine, Wis. "Badger," "Triumph," "Perfect."

XX Century—See Joyce-Cridland Co.

SPECIAL JACKS

(Wheeled, Two and Four Wheel Lifting, Etc.)

ADAMS Jack Co. of America, H. W. Hellman Bldg., Los Angeles, Cal.

AMES Mfg. Co., Franklin, Pa.

BECKERT & Son, William, 1001 E. Ohio St., N. S., Pittsburg, Pa.

BURROUGHS Lift & Truck Co., Racine, Wis

CADY Patent Appliance Co., 755 Central Ave., Cleveland, O.
(See page 223.)

CANTON Foundry & Machine Co., Canton, O. "Universal."
(See page 473.)

EXCEL Jack Mfg. Co., 27 Lansdowne St., Boston, Mass.

HOVEY Jack Co., Port Huron, Mich.

ODELL Automatic Jack Co., Odell, Ill.

READING Automobile Co., 126-28 N. Fifth St., Reading, Pa.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y.

STUCKER, J. M., Ottawa, Kans.

UNIVERSAL—See Canton Foundry & Machine Co.

WEAVER Mfg. Co., Springfield, Ill.

TIRE SAVING JACKS

(For holding car off the floor when not in use)

ASHLAND Mfg. Co., Ashland, O. "Eureka."
(See page 223.)

AUTO Jack Works, 300-08 Michigan St., La Grange, Ind. "Detroit."

AUTOMATIC Tire Rest Co., 1733 McGee St., Kansas City, Mo.

BEARD Auto Lift Co., Pleasant Lake, Ind.

BICYCLE Step Ladder Co., 6 W. Randolph St., Chicago, Ill.

BUFFINGTON & Co., C. A., Berkshire, N. Y.

CANNON, W. B., Park St. & Kalamazoo Ave., Vicksburg, Mich.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

DAYTON Malleable Iron Co., Dayton, O.

DETROIT—See Auto Jack Works.

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O. "Emco."

ELITE Mfg. Co., Ashland, O. "Reliable."

EMCO—See Eberhard Mfg. Co.

EUREKA—See Ashland Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

GARLICK Auto Jack & Prop Co., 250 12th Ave., Paterson, N. J.

HART Mfg. Co., 520 N. Main St., Findlay, O.

HASLUP Motor Jack Co., Sidney, O.

HOCO—See Hoeft & Co.

HOEFT & Co., Ashland Ave. & Kinzie St., Chicago, Ill. "Hoco."

JIFFY JAX—See Lennox Jack Works.

JUSTRITE—See National Jack & Mfg. Co.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O. "Jiffy Jax."

MOORE—See Walker-Moore Mfg. Co.

MORGAN Mfg. Co., John St., Newport, R. I.

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill. "Justrite."

NATIONAL-STANDARD Co., Niles, Mich. "Standard."
(See page 223.)

PERFECT—See Pratt Mfg. Co.

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill. "Perfect."

RACINE—See Walker-Moore Mfg. Co.

RELIABLE—See Elite Mfg. Co.

SEDGWICK Mfg. Co., Third & Chestnut Sts., Richmond, Ind.

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LIFTING JACKS
TIRE SAVERS
STORAGE STANDS

THE

EUREKA LINE

The most complete, the best built and the most economical line of automobile jacks on the market.

These jacks are made of a different construction for cars of different weights and the prices range from $1.00 to $5.00.

THE EUREKA TIRE SAVERS are a great invention. They come in sets of four made of the best workmanship and for the complete sets they sell at $6.50 and $7.50.

THE EUREKA STORAGE STAND —not a jack only a support—costs per set of four, $2.75.

These are retail prices from which we quote dealers liberal discounts. This is a highly salable line and should be found in every dealers' establishment.

Ashland Manufacturing Co.
ASHLAND, OHIO

Standard Automobile Jacks

Best made, Easiest Lifting, Most Durable, Best Finished and Most Complete Line of Automobile Jacks on the Market.

Hard Wood or Metal Handles

Large Output—Right Prices.

Ask for Catalogue.

National-Standard Company
Niles, Mich.
Successors to
Cooks Standard Tool Co.
Kalamazoo, Mich.

Building Jacks has been our business for 18 years. We make them from one to ten ton.

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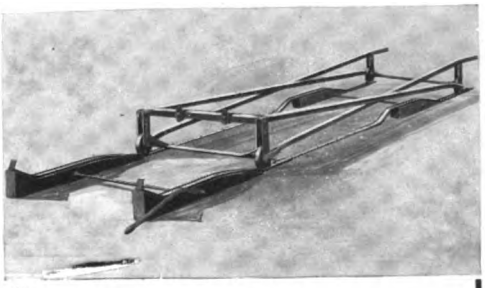
WIS.



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The NEWWAY

The CADY
AUTOMATIC AUTO JACK
Time—Labor—Money-Saver

POSITIVELY AUTOMATIC.—Run your car on it and without a move on your part it lifts all four wheels clear of the floor. Prevents waste tire mileage caused by leaving car resting on the tires and standing in grease and oil on the garage floor. Makes it easier to wash car and put on chains. Remove one or all wheels or make repairs or adjustments—absolutely no trouble. SAVES ITS COST IN A SHORT TIME. Your trade will appreciate it and the saving in expense that it makes. Fully guaranteed. WRITE FOR DETAILS.

THE CADY PATENT APPLIANCE CO.
755 Central Ave. Cleveland, O.
PATENT APPLIED FOR.

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JACKS (Continued)

TIRE SAVING JACKS (Continued)

STANDARD—See National-Standard Co.

UNIQUE—See United States Mfg. Co.

UNITED States Mfg. Co., Mansfield, O. "Unique."

WALKER-MOORE Mfg. Co., 810 Walker St., Racine, Wis. "Moore," "Racine."

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

JARS

RUBBER BATTERY JARS

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y. "Volcan," "Mercury."

DIAMOND Rubber Co., Akron, O.

LUZERNE Rubber Co., Trenton, N. J.

MERCURY—See American Hard Rubber Co.

STOKES Rubber Co., Jos., Trenton, N. J.

VOLCAN—See American Hard Rubber Co.

JIGS

SPEEDOMETER GEAR CENTERING JIGS

WEBER Automobile Supply Co., 6 E. Kiowa St., Colorado Springs, Colo.

JOBBERS

SUPPLY JOBBERS

(This is a list of Jobbers and Dealers in Automobile Supplies who advertise in this publication)

POST & Lester Co., 112 Allyn St., Hartford, Conn.
(See page 227.)

PRUDEN Hardware Co., W. E., 864-66 Eighth Ave., New York, N. Y.
(See page 227.)

ZINKE Co., 1326 Michigan Ave., Chicago, Ill.
(See page 287.)

JOINTS

BALL JOINTS

(For spark and throttle connections)

BILLINGS & Spencer Co., Hartford, Conn.

BIRCHWOOD, C. W., Jacksonville, Fla.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. "Security."
(See pages 227 and 343.)

CINCINNATI Ball Crank Co., Cincinnati, O.
(See page 137.)

GREER, Fredric, 525 W. Van Buren St., Chicago, Ill.

MECHANICAL & Electrical Mfg. Co., 2225 Prairie Ave., Chicago, Ill. "Memco."

MEMCO—See Mechanical & Electrical Mfg. Co.

PENINSULAR Milled Screw Co., Lafayette St., Detroit, Mich.

PERFECTION—See Porter & Co.

PORTER & Co., W. S., 608 S. Dearborn St., Chicago, Ill. "Perfection."

SECURITY—See Chicago Screw Co.

SMITH Mfg. Co., F. H., 3037 Carroll Ave., Chicago, Ill.

UNIVERSAL JOINTS

ACME Universal Joint Mfg. Co., 1425 Fulford St., Kalamazoo, Mich.
(See page 225.)

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind.

BAUSH Machine Tool Co., 500 Wason Ave., Springfield, Mass.

BLOOD Bros., Machine Co., Ransom St. & S. Haven R. R., Kalamazoo, Mich.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 313.)

COOPER Flexible Transmission Co., Eighth Ave. & 18th St., Brooklyn, N. Y.

EVANS—See Merchant & Evans Co.

FRANCKE—See Smith-Serrell Co.

HARTFORD Auto Parts Co., Hartford, Conn.

JAMESVILLE Mfg. Co., Batavia, N. Y.

K-B—See Kinsler-Bennett Co.

KINSLER-BENNETT Co., 69 Vernon St., Hartford, Conn. "K-B."
(See page 227.)

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

LEHMAN, I., 2187 E. Second St., Cleveland, O.

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y. "Walters."

MERCHANT & Evans Co., Philadelphia, Pa. "Evans."

MICHIGAN Auto-Joint Co., 314 Bowery St., Grand Rapids, Mich.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

MUTUAL Machine Co., 25 Wells St., Hartford, Conn. "Warrens."

NEW England Auto Parts Mfg. Co., Kimball Bldg., Boston, Mass.

SMITH-SERRELL Co., 90 West St., New York, N. Y. "Francke."

SPICER Mfg. Co., Plainfield, N. J.
(See page 225.)

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

UNIVERSAL Machine Co., Adams St., Bowling Green, O.
(See page 225.)

WALTERS—See Mechanical Devices Co.

WARRENS—See Mutual Machine Co.

KEYS

ACETYLENE GAS TANK KEYS

AUTO Specialty Co., West Haven, Conn.

BUFFUM Tool Co., Louisiana, Mo.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

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A C M E
Universal Joints

These are the best universal joints that a motor car manufacturer could put in his product. They embody every essential feature necessary to make it the nearest perfect Universal Joint for use in motor cars and trucks.

ACME JOINTS are remarkable for their simplicity and durability and are best adapted to withstand the severe wear and strain to which they are subjected in motor car usage.

The ACME can be removed from a car without moving a unit of the power transmission. This feature alone gives it a great advantage over any other joint in the market.

They are so accurately made that they are interchangeable and necessary repairs can be made without difficulty.

Ask us to prove that Acme Joints are better than those you are now using—we'll do it.

The Acme Universal Joint Mfg. Company

1425 Fulford St., Kalamazoo, Mich.

"Standard" Universal Joints

Roller Bearing Type

Patented

The "Standard" line of joints is complete from starter and cyclecar to the largest trucks.

If you want the very best in universal joints, use our roller bearing type. It is the only joint having a perfectly universal movement. No "lag and catchup" as in ordinary joints. Adjustable for wear, self oiling to moving parts by centrifugal force.

Our Types 3P and 4P are the simplest and most compact models and are also very attractive in price. Type 4P consists of a universal joint built within a large square slip sleeve, thus doing away with the troublesome slip connection or expensive spline.

We use the best quality of alloy steels, carefully harden and treat wearing parts; in fact build Standard joints the best in every way that can be done. Send in your B.P. and let us figure with you. Circulars on request.

The Universal Machine Co.

Adams St., BOWLING GREEN, OHIO

SPICER UNIVERSAL JOINTS

FOR STRENGTH AND DURABILITY

THE JOINT FOR AUTO MANUFACTURERS AND REBUILDERS TO USE

Every bearing surface is case-hardened and ground. Superior quality of material and workmanship enter into it. OIL TIGHT and DUST PROOF, insuring long life of parts. All parts interchangeable.

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L. D. BOLTON, 2215 Dime Savings Bank Bldg., Detroit.

Foreign Representative:
BENJAMIN WHITTAKER,
21 State St., New York.

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KEYS (Continued)

ACETYLENE GAS TANK KEYS (Continued)

GILBERT Mfg. Co., New Haven, Conn.

HARRIS & Reed Mfg. Co., 1500-22 W. 15th St., Chicago, Ill.

MOSSBERG Co., Frank, Attleboro, Mass. (See page 553.)

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind. (See page 509.)

RITZ-WOLLER, Oliver C., 536-38 S. Clark St., Chicago, Ill.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 327)

WHITEHOUSE Lecompte Mfg. Co., 42-54 Elm St., Newark, N. J. (See page 509.)

KITS

TIRE REPAIR KITS

(See also Cement, Tire; also Patches, Tire; also Plugs, Tire; also Sleeves, Tire)

AUTO Time Saver Repair Kit Co., 234-36 Congress St., Boston, Mass.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

H. J. K. Co., 26½ Canal St., Dayton, O. "Lightning."

HAZEN-BROWN Co., Court St., Brockton, Mass.

LIGHTNING—See H. J. K. Co.

M. & M. Mfg. Co., Akron, O.

MICHELIN Tire Co., Milltown, N. J.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

TINGLEY & Co., Chas. O., Rahway, N. J.

YATMAN Rubber Co., 257-69 Mt. Pleasant Ave., Newark, N. J.

KNUCKLES

STEERING KNUCKLES

(See Axles; also Forgings)

LACE

COACH LACE, WEBBING AND CORD

BRIDGEPORT Coach Lace Co., 1731-37 Broadway, New York, N. Y. (See page 351.)

COLUMBIA—See Horstmann Co.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia."

SCHLEGEL Mfg. Co., College Ave. & N. Goodman St., Rochester, N. Y.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

LACING

FABRIC RADIATOR LACING

(See also Leather, Rawhide Lace)

GILMER Co., L. H., 52 N. Seventh St., Philadelphia, Pa. (See page 65.)

STANDARD Woven Fabric Co., Framingham, Mass. (See page 303.)

LAMPS

ACETYLENE LAMPS OR HEAD-LIGHTS

AMERICAN Lamp Works, 253 W. 47th St., New York, N. Y. "Liberty."

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y. (See page 205.)

BADGER Brass Mfg. Co., Lyman Ave., Kenosha, Wis. "Solar."

BROWN Mfg. Co., John W., Columbus, O.

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill. "Diamond."

COLUMBIA—See Hine-Watt Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

DIAMOND—See Chicago Auto Lamp Works.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Majestic," "Victor."

DRESSEL Railway Lamp Works, 3860-80 Park Ave., New York, N. Y.

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J." (See page 229.)

GRAY & Davis, Boston, Mass. (See page 231.)

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn. "Old Sol."

HINE-WATT Mfg. Co., 180 N. Market St., Chicago, Ill. "Columbia."

HOFACKER Mfg. Co., 555 W. 42d St., New York, N. Y. (See page 205.)

INDIANA Lamp Co., Connersville, Ind. "Lunar."

LIBERTY—See American Lamp Works.

LUNAR—See Indiana Lamp Co.

MAJESTIC—See Dietz Co.

NEVEROUT—See Rose Mfg. Co.

OLD SOL—See Hawthorne Mfg. Co.

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Our 1914 Catalog is now ready for distribution. Large Stock and Lowest Prices.
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"SECURITY" BALL JOINTS

Not too tight nor too loose—Always in proper adjustment—No Cotter Pins to lose—No Screws to come out—Easily put in place—Impossible to come apart—Ball Head in line with rod—Firm Joint—No Rattle—

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W. E. PRUDEN HARDWARE CO.

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260-262 W. 52d St.
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The largest stock in the Country

The BEST House in the Country for GARAGE SUPPLIES in General

UNIVERSAL JOINTS

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BEST FOR

Commercial Cars AND Pleasure Vehicles

Made from the finest Drop Forgings, especially case-hardened throughout. Our Universal Joints have no equal for Quality, Design, High Finish, and Skilled Workmanship.

We guarantee deliveries to commence within two or three weeks from receipt of specifications.

Write us for our catalog and get our prices

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MADE IN — HARTFORD, CONN. — BY

THE KINSLER-BENNETT CO.

69 Vernon Street

WESTERN SALES AGENTS

AMERICAN DISTRIBUTING CO., Jackson, Mich.

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LAMPS (Continued)

ACETYLENE LAMPS OR HEAD-LIGHTS (Continued)

P-G-N—See Pagin Lamp Co.

PAGIN Lamp Co., J. R., 1323-25 S. Michigan Ave., Chicago, Ill. "P-G-N."

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N. J.
(See page 433.)

SOLAR—See Badger Brass Mfg. Co.

SUPERIOR Lamp Mfg. Co., 136 W. 52d St., New York, N. Y.

VICTOR—See Dietz Co.

VICTOR Lamp Co., Colerain & Sassafras Sts., Cincinnati, O.

WIDMAN & Co., J. C., 14th & 15th Sts. & G. T. Ry., Detroit, Mich.

DASH LAMPS

(See Lamps, Electric Dash)

ELECTRIC LAMPS OR HEAD-LIGHTS

(See Headlights, Electric)

ELECTRIC DASH OR GAUGE LAMPS

APELCO—See Apple Electric Co.

APPLE Electric Co., Newark, N. J. "Apelco."

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Cello."

CELLO—See Campbell Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

COWLES & Co., C., New Haven, Conn.
(See page 463.)

CULVER-STEARNS Mfg. Co., Worcester, Mass.
(See page 139.)

DOLLY Electric Specialty Co., 1461 Michigan Ave., Chicago, Ill.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 229.)

FAW, J. H., 41 Warren St., New York, N. Y.
(See page 281.)

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

HANDY—See Chicago Electric Mfg. Co.

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Presto."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

PRESTO—See Metal Specialties Mfg. Co.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 139.)

S-H—See Stuart-Howland Co.

STUART-HOWLAND Co., 131-41 Federal St. Boston, Mass. "S-H."

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

ELECTRIC GAUGE LAMPS

(See Lamps, Electric Dash)

ELECTRIC HAND OR INSPECTION LAMPS

(Lamp and flexible cord for attachment to ignition battery)

ADAMS-BAGNALL Electric Co., Cleveland, O.

AMERICAN Enamel Co., Neville St., Providence, R. I. "Britelite."

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

ANDREWS & Co., J. W., Chicago, Ill.

BRITELITE—See American Enamel Co.

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Cello."

CELLO—See Campbell Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

CLUM Mfg. Co., Montgomery Bldg., Milwaukee, Wis.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

COWLES & Co., C., New Haven, Conn.
(See page 463.)

CRESCENT—See McGill Mfg. Co.

CULVER-STEARNS Mfg. Co., Worcester, Mass.
(See page 139.)

CUMINGS Bros., 901-03 S. Saginaw St., Flint, Mich.

CUNO Engineering Corp., 80 S. Vine St., Meriden, Conn.

DELTA Electric Co., 313-405 E. Fourth St., Marion, Ind.

DOLLY Electric Specialty Co., 1461 Michigan Ave., Chicago, Ill.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 229.)

EVER READY—See American Ever Ready Co.

EVEREADY Storage Battery Works of National Carbon Co., 514-24 W. 57th St., New York, N. Y.
(See page 419.)

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GENERAL Electric Co., Schenectady, N. Y.

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

HANDY—See Chicago Electric Mfg. Co.

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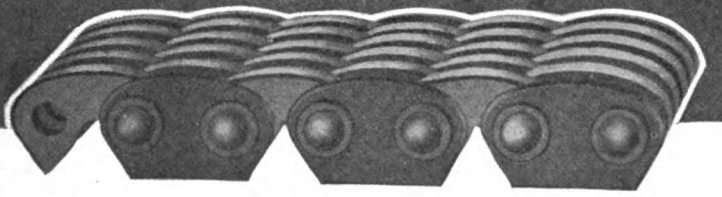
HIGH SPEED CHAINS



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INDIANAPOLIS INDIANA

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LAMPS (Continued)

ELECTRIC HAND OR INSPECTION LAMPS (Continued)

HANDY-ANDY Electric Co., 1046 Lawrence Ave., Chicago, Ill.

HARVARD Electric Co., 525 W. Van Buren St., Chicago, Ill.

MABEYS Electric & Mfg. Co., 940 N. Pennsylvania St., Indianapolis, Ind.

McGILL Mfg. Co., 34 Oak St., Valparaiso, Ind. "Thumbswitch," "Crescent."

NIAGARA Searchlight Co., Eighth St. & Ferry Ave., Niagara Falls, N. Y.

NITELITE—See Providence Electric Mfg. Co.

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Presto."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass. "Pomo."

PARKER-HAMMERTON Mfg. Co., 122 Milk St., Boston, Mass.

POMO—See Morse, Frank W.

PREMIER Electric Co., 4032-42 W. Ravenswood Ave., Chicago, Ill. "Stickalite."

PRESTO—See Metal Specialties Mfg. Co.

PROVIDENCE Electric Mfg. Co., 23 Broad St., Providence, R. I. "Nitelite."

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 139.)

RUSSELL & Co., T. F., 170 Summer St., Boston, Mass.

S.-H.—See Stuart-Howland Co.

STICKALITE—See Premier Electric Co.

STUART-HOWLAND Co., 131-41 Federal St. Boston, Mass. "S-H."

THUMBSWITCH—See McGill Mfg. Co.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WOOD Mfg. Co., Fairfield, Conn.

ELECTRIC INSPECTION LAMPS

(See Lamps, Electric Hand)

ELECTRIC SIDE AND TAIL LAMPS

ADAMS-BAGNALL Electric Co., Cleveland, O.

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 209.)

ADLAKE—See Adams & Westlake Co.

AIKEN—See Dodge, Frank.

AUTO Fender Safety Lamp Co., Corinth, N. Y.

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y.
(See page 205.)

BADGER Brass Mfg. Co., Lyman Ave., Kenosha, Wis. "Solar."

BOESCH Lamp Co., 1135 Mission St., San Francisco, Cal.

BROWN Mfg. Co., John W., Columbus, O.

BUFFALO Lamp Co., 106-10 Broadway, Buffalo, N. Y.

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Cello."

CELLO—See Campbell Co.

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O. "Pathfinder."

COMBINATION Tail Light Co., 954 Tremont St., Boston, Mass. (Tail lamps only). "Universal."

COWLES & Co., C., New Haven, Conn.
(See page 463.)

DEARBORN Hardware Mfg. Co., 2911-19 Carroll Ave., Chicago, Ill.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Excelsior."

DODGE, Frank, 169 Massachusetts Ave., Boston, Mass. "Aiken."

DRESSEL Railway Lamp Works, 3860-80 Park Ave., New York, N. Y.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 229.)

ELECTRIC Auto-Lite Co., Toledo, O.
(See page 159.)

ELECTROBOLA—See Garage Equipment Mfg. Co.

ENGLISH & Mersick Lamp & Foundry Co., 249 Park St., New Haven, Conn.

ESTERLINE Co., 228 E. South St., Indianapolis, Ind. "Golden Glow."

EXCELSIOR—See Dietz Co.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Electrobola."
(See page 87.)

GEM Stamped Steel Co., Everett Ave. & Blvd., (Chelsea Station), Boston Mass. (Tail lamps only.)

GOLDEN GLOW—See Esterline Co.

GRAY & Davis, Boston, Mass.
(See page 231.)

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAMMER Co., E. A., 1839 Euclid Ave., Cleveland, O.

HOFACKER Mfg. Co., 555 W. 42d St., New York, N. Y.
(See page 205.)

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

INDIANA Lamp Co., Connersville, Ind. "Lunar."

LUNAR—See Indiana Lamp Co.

NEVEROUT—See Rose Mfg. Co.

P-G-N—See Pagin Lamp Co.

PAGIN Lamp Co., J. R., 1323-25 S. Michigan Ave., Chicago, Ill. "P-G-N."

PATHFINDER—See Columbus Auto Brass Co.

PORTLAND Auto Specialty Co., Fidelity Bldg., Portland, Me.

ROSCO—See Rosen & Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 139.)

SOLAR—See Badger Brass Mfg. Co.

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GRAY & DAVIS
STARTING - LIGHTING SYSTEM

IT is built in the largest factory in the world devoted exclusively to the manufacture of electric equipment for automobiles.

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The reputation of Gray & Davis lamps has extended to every part of the world where automobiles are found. These lamps are extremely handsome in design. The remarkable brilliancy they give is due to their scientific adjustment and careful workmanship.

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LAMPS (Continued)

ELECTRIC SIDE AND TAIL LAMPS (Continued)

STAFFORD Auto Lamp & Number Co., 1475 Michigan Ave., Chicago, Ill. (Tail lamps only.)

SUPERIOR Lamp Mfg. Co., 136 W. 52d St., New York, N. Y.

UNIVERSAL—See Combination Tail Light Co.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

VICTOR Auto Parts Co., Second & Elm Sts., Cincinnati, O.

VICTOR Lamp Co., Colerain & Sassafras Sts., Cincinnati, O.

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburgh), Pittsburg, Pa.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WIDMAN & Co., J. C., 14th & 15th Sts., & G. T. Ry., Detroit, Mich.

ELECTRIC TAIL LAMPS

(See Lamps, Electric Side and Tail)

GAUGE LAMPS

(See Lamps, Electric Dash or Gauge)

HAND LAMPS

(See Lamps, Electric Hand)

INSPECTION LAMPS

(See Lamps, Electric, Hand or Inspection)

MINIATURE TUNGSTEN LAMPS

ALPHA Lamp Co., 113 Grant Ave., Harrison, N. J.

BANNER Electric Works, Youngstown, O.

BRILLIANT Electric Co., Electric Bldg., Cleveland, O.

BRYAN-MARSH Electric Works, 431 S. Dearborn St., Chicago, Ill.

BUCKEYE Electric Works, B. of L. E. Bldg., Cleveland, O.

COLONIAL Electric Works, Warren, O.

COLUMBIA Incandescent Lamp Co., Equitable Bldg., St. Louis, Mo.

DOMESTIC Tungsten Lamp Co., 575 Bergenline Ave., West New York, N. J.

EDISON Lamp Works, Harrison, N. J.

ELUX Miniature Lamp Works, 324 Lafayette St., New York, N. Y.

FEDERAL Miniature Lamp Division, National Lamp Works of General Electric Co., 501 S. Jefferson St., Chicago, Ill. (See page 233.)

FOSTORIA Incandescent Lamp Works, Fostoria, O.

FRANCO—See Interstate Electric Novelty Co.

GENERAL Electric Co., Schenectady, N. Y.

GENERAL Incandescent Lamp Co., Electric Bldg., Cleveland, O.

HOWARD Miniature Lamp Co., Ampere, N. J. "Reliable."

INDEPENDENT Lamp & Wire Co., 1733 Broadway, New York, N. Y.

INTERSTATE Electric Novelty Co., 29 Park Pl., New York, N. Y. "Franco." (See page 347.)

JAEGER Co., H. J., 68-70 Hudson St., Hoboken, N. J. (See page 233.)

McCANDLESS & Co., H. W., 67-69 Park Pl., New York, N. Y. (See page 233.)

PACKARD Lamp Works, Warren, O.

PEERLESS Lamp Works, Warren, O.

RELIABLE—See Howard Miniature Lamp Co.

STERLING Electric Lamp Works, Warren, O.

U. S. INCANDESCENT Lamp Co., Laclede Bldg., St. Louis, Mo.

WESTINGHOUSE Lamp Co., Bloomfield, N. J.

OIL SIDE AND TAIL LAMPS

ADAMS & Westlake Co., Chicago, Ill. "Adlake." (See page 209.)

ADLAKE—See Adams & Westlake Co.

BADGER Brass Mfg. Co., Lyman Ave., Kenosha, Wis. "Solar."

BOESCH Lamp Co., 1135 Mission St., San Francisco, Cal.

BROWN Mfg. Co., John W., Columbus, O "Perfection."

CHAMPION—See Dietz Co.

COLD BLAST—See Ham Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

COWLES & Co., C., New Haven, Conn. (See page 463.)

DAINTY—See Dietz Co.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Sterling, Jr.," "Queen," "Regal," "Ideal," "Orient," "Dainty," "Royal," "Champion," "Union," "Royal Junior."

DRESSEL Railway Lamp Works, 3260-80 Park Ave., New York, N. Y.

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J". (See page 229.)

ENGLISH & Mersick Lamp & Foundry Co., 249 Park St., New Haven, Conn.

GRAY & Davis, Boston, Mass. (See page 231.)

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAM Mfg. Co., C. T., 731 Oak St., Rochester, N. Y. "Cold Blast."

HOFACKER Mfg. Co., 555 W. 42d St., New York, N. Y. (See page 205.)

IDEAL—See Dietz Co.

IDEAL Lamp Co., 216-18 Main St., Cincinnati, O.

INDIANA Lamp Co., Connersville, Ind. "Lunar."

LUNAR—See Indiana Lamp Co.

NEVEROUT—See Rose Mfg. Co.

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FEDERAL MAZDA AUTOMOBILE LAMPS

These lamps are the best the market affords because:

1. Each individual lamp is carefully inspected and tested in the factory to insure perfect quality.
2. Their specially constructed, drawn-wire filaments stand the hardest usage on rough roads.
3. They stay bright.

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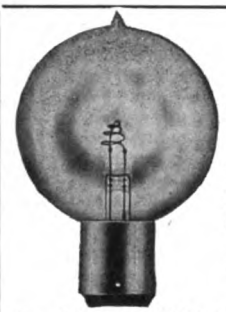
National Lamp Works of General Electric Co.



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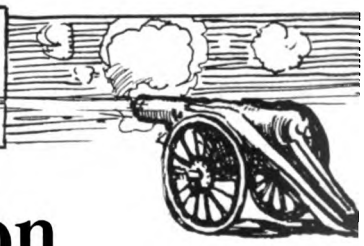
SIDE LIGHT	4 C.P.	6V.	.35¢
REAR LIGHT	3 C.P.	6V.	.30¢
SPEEDOMETER	3 C.P.	6V.	.30¢
DOME	2 C.P.	6V.	.50¢
TROUBLE	4 C.P.	6V.	.50¢
LAMP CHEST			



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The big cut in prices of McCandless Mazda Automobile Lamps leaves no excuse for the dealer who has felt it necessary to sell a cheap inferior grade of lamps. Dealers who give their customers McCandless Mazda Automobile Lamps and the benefit of this cut in prices will have them again for re-orders; those who do not will send them elsewhere.

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Cincinnati	Baltimore	St. Louis	Denver
Detroit	Pittsburg	New Orleans	Butte

McCANDLESS WESTINGHOUSE MAZDA LAMPS

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LAMPS (Continued)

OIL SIDE AND TAIL LAMPS (Continued)

ORIENT—See Dietz Co.

PERFECTION—See Brown Mfg. Co.

QUEEN—See Dietz Co.

REGAL—See Dietz Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

ROYAL—See Dietz Co.

ROYAL JUNIOR—See Dietz Co.

SOLAR—See Badger Brass Mfg. Co.

STERLING, JR.—See Dietz Co.

SUPERIOR Lamp Mfg. Co., 136 W. 52d St., New York, N. Y.

UNION—See Dietz Co.

VICTOR Lamp Co., Colerain & Sassafras Sts., Cincinnati, O.

WIDMAN & Co., J. C., 14th & 15th Sts. & G. T. Ry., Detroit, Mich.

SIDE LAMPS

(See Lamps, Electric Side; also Lamps, Oil Side)

TAIL LAMPS

(See Lamps, Electric Side and Tail; also Lamps, Oil, Side and Tail)

TUNGSTEN LAMPS

(See Lamps, Miniature Tungsten)

WIRE LAMPS

KENYON Searchlight Co., 11-15 Woodbridge St., Detroit, Mich.

LAVA

AMERICAN Lava Co., Chattanooga, Tenn.

STEWARD Mfg. Co., D. M., Chattanooga, Tenn.

LEATHER

ARTIFICIAL OR IMITATION LEATHER

ARMITAGE Leather Co., Detroit, Mich. (See page 235.)

BOSTON Artificial Leather Co., 200 Fifth Ave., New York, N. Y. "Moroccoline."

BULL DOG—See Mutty Co.

CARR Co., F. S., Boston, Mass. "Neverleek." (See page 121.)

CHASE & Co., L. C., Boston, Mass. (See page 123.)

du PONT Fabrikoid Co., Wilmington, Del.

GRANITOL—See Kearney Co.

IMPERIAL—See Kearney Co.

KEARNEY Co., T. F., 220 Devonshire St., Boston, Mass. (Importers.) "Granitol," "Imperial." (See page 237.)

KERATOL Co., South & Van Buren Sts., Newark, N. J.

MAROKENE Co., 6 Fletcher St., New York, N. Y.

MOROCCOLINE—See Boston Artificial Leather Co.

MUTTY Co., L. J., Boston, Mass. "Bull Dog." (See page 237.)

NEVERLEEK—See Carr Co.

O'BANNON Corp., 200 Fifth Ave., New York, N. Y. (See page 235.)

PANTASOTE Co., 11 Broadway, New York, N. Y.

TEXTILEATHER Co., 212 Fifth Ave., New York, N. Y.

FRICTION LEATHER

(For lining brakes and clutches—See also Banding Brake; also Belting, Leather; also Fibre, Hard)

AMERICAN Belting & Tanning Co., 135 Oliver St., Boston, Mass.

BONNER & Barnewell, 30 Church St., New York, N. Y.

CHICAGO Belting Co., 113-25 N. Green St., Chicago, Ill.

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

COE & Brown, 202-04 George St., New Haven, Conn.

DETROIT Clutch Cover Co., 62-64 Jefferson Ave., Detroit, Mich.

DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich.

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

EXCELMO—See Missouri Belting Co.

G & K—See Graton & Knight Mfg. Co.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K." (See page 67.)

HIDE, Leather & Belting Co., Indianapolis, Ind. (See page 69.)

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

HUDSON Belting Co., 1-3 Eaton Pl., Worcester, Mass.

M.L.B.—See Milwaukee Leather Belting Co.

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O. "Suregrip."

MILWAUKEE Leather Belting Co., 499 12th St., Milwaukee, Wis. "M. L. B."

MISSOURI Belting Co., Grand Ave. & La Salle St., St. Louis, Mo. "Excelmo."

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We manufacture a variety of qualities suitable for all purposes for which real leather is used, in all the standard leather grains, colors and finishes.

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Artificial Leather

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Give Us The Opportunity.

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LEATHER (Continued)

FRICTION LEATHER (Continued)

NATIONAL Leather Belting Co., 342 E. 38th St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich. (See page 69.)

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

PROVIDENCE Belting Co., 25 Charles St., Providence, R. I.

RAHMANN & Co., Geo., 31 Spruce St., New York, N. Y.

SCHIEREN, Co., Chas. A., New York, N. Y.

SHULTZ Belting Co., 402 Barton St., St. Louis, Mo.

SUREGRIP—See Mau-Sherwood Supply Co.

TAYLOR Belting Co., 247 S. Meridian St., Indianapolis, Ind.

WAYNE Belting Co., 1212 Second Ave., Detroit, Mich.

WILDER-MANNING Tanning Co., Waukegan, Ill.

WILLIAMS & Sons, I. B., Dover, N. H.

NATURAL LEATHER

AMERICAN Oak Leather Co., Cincinnati, O.

ARMITAGE Leather Co., Detroit, Mich. (See page 235.)

ASHTABULA Hide & Leather Co., Ashtabula, O.

ATLANTIC Leather Co., 173 Wright St., Newark, N. J.

BADGER State Tanning Co., Sheboygan, Wis.

BEAVER—See Straus & Sons, M.

BLANCHARD Bro. & Lane, 20 Bruen St., Newark, N. J.

BRIDGEPORT Patent Leather Mfg. Co., Bridgeport, Conn. "Charter Oak."

BYRON & Sons, W. D., Williamsport, Md. "Tanok."

CARTER Co., George R., 1600-20 Kentucky Ave., Connersville, Ind. (Dealers.)

CHARTER OAK—See Bridgeport Patent Leather Mfg. Co.

CLARK Leather Co., 723 Gough St., San Francisco, Cal. "Royal."

CLEVELAND Tanning Co., Jennings & Dennison Aves., S. W., Cleveland, O.

HOWELL & Co., T. P., New & Nuttmann Sts., Newark, N. J. "Lion."

HOWELL-HINCHMAN Co., Middletown, N. Y.

HUDSON Leather Co., 15 Margaretta St., Newark, N. J.

LACKAWANNA Leather Co., Hackettstown, N. J.

LION—See Howell & Co.

OTTAWA Leather Co., Grand Haven, Mich.

PEARCE Bros. Leather Co., 768 Frelinghuysen Ave., Newark, N. J.

RADEL Leather Mfg. Co., Hamburg Place Rd., Newark, N. J.

RASER Tanning Co., Ashtabula, O.

REILLY Co., John, Ave. C & Murray St., Newark, N.J.

REILLY & Son, P., Mott St. & Passaic Ave., Newark, N. J. "Stag."

ROSER & Son, Hermann, Glastonbury, Conn.

ROYAL—See Clark Leather Co.

SHIELDS Bros., Bombay, N. Y.

SMITH Co., Hugh, 210 Central Ave., Newark, N. J.

SMITH & Sons, L. M., 59 Lock St., Newark, N. J.

SMYTH Co., Charles, 240-50 Central Ave., Newark, N. J.

STAG—See Reilly & Son.

STANDARD Leather Co. of Pittsburg, 296 Spring Garden Ave., N. S. Pittsburg, Pa.

STENGEL, Geo., Frelinghuysen & Elizabeth Aves., Newark, N. J.

STENGEL & Rothschild, Kossuth & Berlin Sts., Newark, N. J.

STRAUS & Sons, M., 440 Frelinghuysen Ave., Newark, N. J. "Beaver."

TANOK—See Byron & Sons.

TERWILLIGER-VINCENT Leather Co., 173 Wright St., Newark, N. J.

TURNER & Rutter, 32 Spruce St., New York, N. Y.

WARD & Co., E. S., 414 Frelinghuysen Ave., Newark, N. J.

WING Co., Charles, Amesbury, Mass. (Dealers.) (See page 397.)

RAWHIDE LACE LEATHER

(For preventing motor hoods or bonnets from rattling)

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

EAGLE—See Mooney Belting Co.

G & K—See Graton & Knight Mfg. Co.

GAY, Fred E., Thornton, R. I.

GILT EDGE—See Williams & Sons.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K." (See page 67.)

HIDE, Leather & Belting Co., Indianapolis, Ind. (See page 69.)

LADEW Co., Edward R., 82-84 Fulton St., New York, N. Y.

MISSOURI Belting Co., Grand Ave. & La Salle St., St. Louis, Mo. "Victor."

MOONEY Belting Co., 844 W. Sixth St., Cincinnati, O. "Eagle."

NATIONAL Leather Belting Co., 342 E. 38th St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich (See page 69.)

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

NORWICH Belt Mfg. Co., Norwich, Conn.

PACIFIC Leather Works, 239 12th St., Oakland, Cal.

RAHMANN & Co., Geo., 31 Spruce St., New York, N. Y.

RICHMOND Leather Mfg. Co., 2201-07 E. Cary St., Richmond, Va.

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Our new sample books advertised in the last issue of this Directory, have been unavoidably delayed. They will be ready for delivery October 1st. They contain a very large and complete line, comprising two large books. If you are interested in **high-grade automobile fabrics** at a low price, write us to send you sample books and price list.

L. J. MUTTY CO., BOSTON, MASS.

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LEATHER (Continued)

RAWHIDE LACE LEATHER (Continued)

SHULTZ Belting Co., 402 Barton St., St. Louis, Mo.

VICTOR—See Missouri Belting Co.

WEATHERHEAD-THOMPSON Co., Pawtucket, R. I.

WILLIAMS & Sons, I. B., Dover, N. H. "Gilt Edge."

LEGGINGS

MOTORISTS LEGGINGS

ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill. "Reliance," "Napoleon," "Tooinone," "Universal," "Boulevard," "Harvard," "National."

BOULEVARD—See Atlas Specialty Mfg. Co.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

HAGERSTOWN Shoe & Legging Co., Hagerstown, Md. "Halco."

HALCO—See Hagerstown Shoe & Legging Co.

HARVARD—See Atlas Specialty Mfg. Co.

NAPOLEON—See Atlas Specialty Mfg. Co.

NATHAN Novelty Mfg. Co., 90G Reade St., New York, N. Y.
(See page 347.)

NATIONAL—See Atlas Specialty Mfg. Co.

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

RELIANCE—See Atlas Specialty Mfg. Co.

SYRACUSE & Eldridge Glove & Legging Co., 1020 S. Salina St., Syracuse, N. Y.

TOOINONE—See Atlas Specialty Mfg. Co.

UNIVERSAL—See Atlas Specialty Mfg. Co.

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

LEVERS

BRAKE AND GEAR SHIFT LEVERS

(Finished or Machined Levers. For Levers in the rough—See Castings; also Forgings)

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind.

BILLINGS & Spencer Co., Hartford, Conn.

COTTA Gear Co., 720-30 Sixth St., Rockford, Ill.

COTTA Transmission Co., 814 S. Main St., Rockford, Ill.
(See page 187.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

HAZARD Motor Mfg. Co., 28 Scherer St., Rochester, N. Y.

JAMESVILLE Mfg. Co., Batavia, N. Y.

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

OOSTDYK Gear Shifter Co., Goldberg Bldg., Detroit, Mich.

PIPER Machine Co., 560-70 N. Elder Ave., Indianapolis, Ind.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Co., T. W., Kilgore & Perkins Aves., Muncie, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 239.)

WARNER Mfg. Co., Toledo, O.
(See page 405.)

LIFTERS

ONE MAN TOP LIFTERS

(For One Man Tops—See Tops, Automobile)

BROWN, W. H., Rose Bldg., Cleveland, O.

CRARY Co., 650-52 Woodward Ave., Detroit, Mich. "Jiffy."

JIFFY—See Crary Co.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O.

LIGHTERS

ACETYLENE LAMP LIGHTERS

(See also Burners, Special Acetylene Lamp)

ADJUSTABLE Lighter Co., 18 Pearl St., Newton, Mass.

ADVANCE Motor Specialties Co., 508 S. Dearborn St., Chicago, Ill. "Matchless."

AJAX Auto Lighter Co., Lansing, Mich.

AUTO Improvement Co., Fuehring Blk., Indianapolis, Ind.

AUTOMOBILE Lighting Co., Holyoke, Mass. "Frary."

BENFORD Mfg. Co., Box H., Mt. Vernon, N. Y. "Monarch."
(See page 303.)

CULMER Engineering Co., 6 Church St., New York, N. Y.

DUNN-RAY Co., Taunton, Mass.

FEESER Co., Frank S., 1102 Prospect St. Indianapolis, Ind. "Superior."

FLASH—See Motor Specialties Co.

FRARY—See Automobile Lighting Co.

G. C. A. Mfg. Co., Pittsfield, Mass. "Grinnell."

GRINNELL—See G. C. A. Mfg. Co.

HAIGHT Auto Lighter Co., Lansing, Mich.

HOME Light Co., 2108 Dayton St., Chicago, Ill. "U. S."

IDEAL Brass Works, Tenth & Canal Sts., Indianapolis, Ind.

INST Lighter Co., 59 E. Main St., Columbus, O.

MATCHLESS—See Advance Motor Specialties Co.

MONARCH—See Benford Mfg. Co.

MOTOR Specialties Co., Waltham, Mass "Flash."

Complete Index to Classification appears on Pages 8 to 26.

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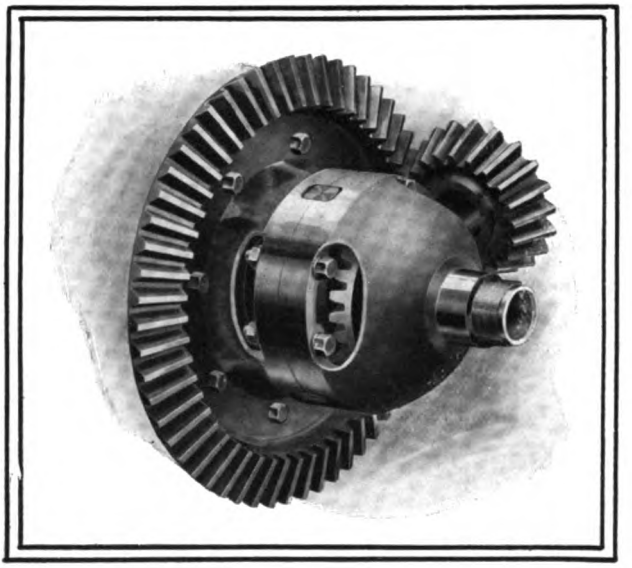
TRANSMISSIONS—STEERING GEARS

CLUTCHES

DIFFERENTIALS CONTROL LEVERS



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LIGHTERS (Continued)

ACETYLENE LAMP LIGHTERS (Continued)

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind. **(See page 509.)**

ROUSSEAU, David, Ossining, N. Y.

S. & M. Mfg. Co., Salem, O.

SAFETY Gas Lighter Co., 48 Phoenix Row, Haverhill, Mass.

SEARCHLIGHT Co., 1016 Karpen Blvd., Chicago, Ill.

SUPERIOR—See Feeser Co.

U. S.—See Home Light Co.

ELECTRIC CIGAR LIGHTERS

CENTURY—See Mabeys Electric & Mfg. Co.

COWLES & Co., C., New Haven, Conn. **(See page 463.)**

HARWOOD, C. F., 516 Atlantic Ave., Boston, Mass.

MABEYS Electric & Mfg. Co., 940 N. Pennsylvania St., Indianapolis, Ind. "Century."

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Presto."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. **(See page 163.)**

PRESTO—See Metal Specialties Mfg. Co.

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

OIL LAMP LIGHTERS

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

LIGHTS

ELECTRIC DOME LIGHTS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

APELCO—See Apple Electric Co.

APPLE Electric Co., Newark, N. J. "Apelco."

CAMPBELL Co., A. S., 284 Commercial St. Boston, Mass. "Cello."

CELLO—See Campbell Co.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

COWLES & Co., C., New Haven, Conn. **(See page 463.)**

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

HOFACKER Mfg. Co., 555 W. 42d St., New York, N. Y. **(See page 205.)**

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

HUDSON-FULTON—See Storage Battery Supply Co.

LIBERTY Cut Glass Works, Egg Harbor City, N. J. **(See page 207.)**

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. **(See page 163.)**

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco." **(See page 139.)**

STORAGE Battery Supply Co., 239 E. 27th St., New York, N. Y. "Hudson-Fulton."

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

ELECTRIC GAUGE LIGHTS

(See Lamps, Electric Dash)

ELECTRIC HEADLIGHTS

(See Headlights, Electric)

WASH STAND LIGHTS

(For Lighting Car on Wash Stand)

ALADDIN—See Smith Mfg. Co.

SMITH Mfg. Co., I. J., 1007 Ave. Q, Brooklyn, N. Y. "Aladdin."

LINING

BODY OR FRAME LINING

GILMER Co., L. H., 52 N. Seventh St., Philadelphia, Pa. **(See page 65.)**

RUSSELL Mfg. Co., Middletown, Conn.

WESTERN Felt Works, 4115-33 Ogden Ave., Chicago, Ill.

BRAKE LINING

(See Banding, Brake; also Leather, Friction; also Fibre, Hard)

LINOLEUM

AMERICAN Linoleum Mfg. Co., 366 Fifth Ave., New York, N. Y.

ARMSTRONG Cork Co., 28d St. & Railroad Ave., Pittsburg, Pa.

BLABON Co., Geo. W., 21st St. & Hunting Park Ave., Philadelphia, Pa.

COOK'S Linoleum Co., Trenton, N. J.

LIN-RHUBER—See Nairn Linoleum Co.

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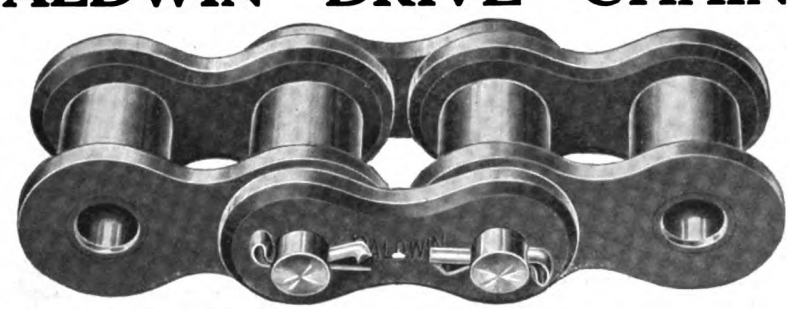

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C. J. Iven, Rochester, N. Y.
F. Shirley Boyd, 903 Boylston St., Boston, Mass.
Neustadt Automobile Supply Co., 3200 Locust St., St. Louis, Mo.
M. & M. Co., 501 High Ave., East, Cleveland, Ohio.
N. A. Petry Co., Inc., 1427 Vine St., Phila., Pa.
M. A. Bryte, 788 Mission St., San Francisco, Cal.
W. D. Foreman, 1436 Michigan Ave., Chicago, Ill.

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LINOLEUM (Continued)

MONARCH Rubber & Oil Cloth Co., Drexel Bldg., Philadelphia, Pa.

NAIRN Linoleum Co., Newark, N. J. "Lin-Rhuber."
(See page 241.)

POTTER, Sons & Co., Thomas, Lafayette Bldg., Philadelphia, Pa.

RINGWALT Linoleum Works, 50 Union Sq., New York, N. Y.

LOCKS

AUTOMOBILE LOCKS

(For Locking Steering Gears or Gear Levers; For Lock Switches—See Switches, Electric Lock; For Lock Valves—See Valves, Gasoline Lock)

B. & W.—See Universal Mfg. Co.

BACKUS Novelty Co., 612 Water St., Smethport, Pa.
(See page 243.)

BENHAM—See Shroyer & Co.

BRACELET Auto Lock Co., 32 N. Clark St., Chicago, Ill.

BREAKSTONE, S., 1436-38 S. Michigan Ave., Chicago, Ill. "Watch Dog."

BREMER-WILSON Mfg. Co., 1421 Michigan Ave., Chicago, Ill. "Triplex."

BRIDGES—See Cochran Pipe Wrench Mfg. Co.

COCHRAN Pipe Wrench Mfg. Co., 7800 Woodlawn Ave., Chicago, Ill. "Bridges."

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

COULS—See Pneumatic Spring & Lock Co.

FORD Lock Co., 1042 S. Olive St., Los Angeles, Cal.

GENERAL Utility Co., 1326-30 Ogden St., Philadelphia, Pa. "Parker."

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill.

LAWRENCE Specialty Co., Boston, Mass.

MABEYS Electric & Mfg. Co., 940 N. Pennsylvania St., Indianapolis, Ind.

MILLER Hardware Co., T. T., 30-32 N. Fourth St., Easton, Pa.

NORISKO—See Rogers Mfg. Co.

PARKER—See General Utility Co.

PNEUMATIC Spring & Lock Co., 134 St. Antoine St., Detroit, Mich. "Couls."

ROBE Lock Co., 529-31 Linden St., Oakland, Cal.

ROCHESTER Safety Lock Co., 530 Main St., Rochester, Ind.

ROGERS Mfg. Co., C. J., Broad & Race Sts., Philadelphia, Pa. "Norisko."

SHROYER & CO., G. W., 102-06 Main St., N. Dayton, O. "Benham."

TRIPLEX—See Bremer-Wilson Mfg. Co.

UNIVERSAL Mfg. Co., Racine, Wis. "B. & W."
(See page 243.)

WATCH DOG—See Breakstone, S.

WELCH Bros., Pontiac, Mich.

YALE & Towne Mfg. Co., 9 E. 40th St., New York, N. Y.
(See page 243.)

CABINET AND PADLOCKS

AMERICAN Keyless Lock Co., 628 W. Jackson Blvd., Chicago, Ill.

CORBIN Cabinet Lock Co., New Britain, Conn.
(See page 243.)

EAGLE Lock Co., Terryville, Conn.

FRAIM Lock Co., E. T., Park Ave. & Jefferson St., Lancaster, Pa.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

SLAYMAKER Lock Mfg. Corp., 808-70 First St., Lancaster, Pa.

YALE & Towne Mfg. Co., 9 E. 40th St., New York, N. Y.
(See page 243.)

DOOR LOCKS

ÆTNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

APPLEBY & Co., W. H., 224 N. Desplaines St., Chicago, Ill.

BRAINERD Mfg. Co., East Rochester, N. Y.

COWLES & Co., C., New Haven, Conn.
(See page 463.)

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 205.)

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

PARSONS Mfg. Co., 21st & Fort Sts., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

LOOPS

BRASS SNAP AND STRAP LOOPS

(See also Fittings, Top)

ANCHOR—See North & Judd Mfg. Co.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

COWLES & Co., C., New Haven, Conn.
(See page 463.)

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 365.)

DESOCO—See Detroit Socket Co.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 205.)

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

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AUTO LOCK

The tremendous loss of cars last year —over $1,000,000 worth by theft—has created a very large demand for a car lock.

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The lock is case-hardened steel with rounded teeth and bull-dog grip jaws opening 4½ inches. Snapped on in a minute. Can't be removed without special key.

Price $1.00. They also come in sets of two or three locks to which the same key is applicable.

Liberal discounts to dealers. This is certainly one of the most salable novelties a dealer can show.

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We invite correspondence with manufacturers and others who may be interested in the various types of motor car locks manufactured by this company.

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Exclusive Selling Agents

CORBIN AUTOMOBILE TOOL BOX LOCK

No. 1217

CAST BRASS
Buffed & Lacquered

Can be locked without use of key by pressing button.

The Lever Serves as a Lift Handle and when drawn down into Locking position prevents rattling of cover.

AUTOMOBILE LOCKS for all Purposes

CORBIN CABINET LOCK CO.
The American Hardware Corp., Successor
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New York—Phila.—Chicago

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LOOPS (Continued)

BRASS SNAP AND STRAP LOOPS (Continued)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NORTH & Judd Mfg. Co., New Britain, Conn. "Anchor."

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 163.)

SMITH & Co., Jos. N., Detroit, Mich. (See page 203.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 327.)

WIENER-BARNET Co., 212-28 Adams St. Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

LUBRICANTS

OILS AND GREASES

(See Oils, Lubricating; also Greases, Cup and Gear)

LUBRICATORS

HAND LUBRICATORS OR OIL PUMPS

COX Brass Mfg. Co., Albany, N. Y. (See page 511.)

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. (See page 329.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

MECHANICAL LUBRICATORS OR OIL PUMPS

(Engine driven Oil Pumps)

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

DETROIT Lubricator Co., Detroit, Mich. (See page 245.)

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

KINSEY Mfg. Co., Toledo, O. "Kinwood."

KINWOOD—See Kinsey Mfg. Co.

LAVIGNE Mfg. Co., 625-41 Commonwealth Ave., Detroit, Mich.

LEE Co., Wm. O., Port Huron, Mich. (See page 111.)

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McCORD Mfg. Co., Detroit, Mich. (See pages 176 and 177.)

MADISON-KIPP Lubricator Co., Madison, Wis.

MANZEL Bros. Co., 320 Babcock St., Buffalo, N. Y. (See page 317.)

NEELY Mfg. Co., 829 Wells St., Chicago, Ill.

OSGOOD Lubricator Co., J. L., 45 Pearl St., Buffalo, N. Y.

PEDERSEN Lubricator Co., 636 First Ave., New York, N. Y. (See page 245.)

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis.

WEISS, L. T., 293 Taaffe Pl., Brooklyn, N. Y. (See page 245.)

OIL AND GREASE CUP LUBRICATORS

(See Cups, Oil and Grease)

PRESSURE LUBRICATORS

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

KRAHN Mfg. Co., 588 Clinton St., Milwaukee, Wis.

PEDERSEN Lubricator Co., 636 First Ave., New York, N. Y. (See page 245.)

SHERWOOD Mfg. Co., 1702-16 Elmwood Ave., Buffalo, N. Y.

WILKINSON Co., Wm. H., West Medway Mass.

LUGS

TIRE LUGS

CLARK Novelty Co., 380 Exchange St., Rochester, N. Y.

CRYDER & Co., 583 Park Ave., New York, N. Y. (Importers.) "Hermetic."

HERMETIC—See Cryder & Co.

LUMBER

AUTOMOBILE LUMBER

ANDERSON-TULLY Co., Memphis, Tenn.

APPALACHIA Lumber Co., Union Central Life Bldg., Cincinnati, O.

BAKER Lumber Co., Turrell, Ark.

CARRIER Lumber & Mfg. Co., Sardis, Miss.

DARLING Lumber Co., J. W., Cincinnati, O.

GREBLE-SINE Lumber Co., Peoples Gas Bldg., Chicago, Ill.

HIMMELBERGER-HARRISON Lumber Co., Cape Girardeau, Mo.

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DELIVERS OIL AT 200 LBS. PRESSURE
BELT OR GEAR DRIVEN IN EITHER DIRECTION

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Every drop of oil is forced to the place where it is needed, by a valveless pump. There is no chance for the oil to fail to reach the right spot.

And every drop of oil is measured—never too much, but always enough. The Detroit Force Feed Oiler is insurance against wasted oil and a damaged engine.

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LUMBER (Continued)

AUTOMOBILE LUMBER (Continued)

LAMB-FISH Lumber Co., Charleston, Miss.

LEONARD, H. R., Seaboard Bank Bldg., Norfolk, Va.

LOVE, Boyd & Co., ft. S. Second St., Nashville, Tenn.

LUEHRMANN Hardwood Lumber Co., Chas. F., 148 Carroll St., St. Louis, Mo.

MOORE & McFerren, Memphis, Tenn.

NEW River Lumber Co., Union Trust Bldg., Cincinnati, O.

PAEPKE-LEICHT Lumber Co., 111 W. Washington St., Chicago, Ill.

SHIELS & Co., Charles F., McLane Ave. & Gest St., Cincinnati, O.

SULLIVAN & Co., T., Niagara & Arthur Sts., Buffalo, N. Y.

TAUSSIG, L. J., Commercial Bldg., St. Louis, Mo.

THREE States Lumber Co., Memphis, Tenn.

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(See also Screw Machine Products)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

ADVANCE Machine Co., 654-58 Franklin St., Detroit, Mich.

ADVANCE Mfg. Co., Racine, Wis. (See page 467.)

ÆTNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Air Compressor Co., 1523-31 W. Fort St., Detroit, Mich.

AMERICAN Brass & Iron Co., Detroit, Mich. (See page 83.)

AMERICAN Car & Ship Hardware Mfg. Co., Dept. T, New Castle, Pa. (See page 249.)

AMERICAN Die & Tool Co., Reading, Pa. (See page 189.)

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y. (See page 247.)

ATLAS Brass Foundry Co., 980-90 S. Front St., Columbus, O.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich. (See page 209.)

AUTOPARTS Mfg. Co., Detroit, Mich.

BILLINGS & Spencer Co., Hartford, Conn.

BLACK & Decker Mfg. Co., 109-15 S. Calvert St., Baltimore, Md.

BLAIR Tool & Machine Works, 521 Greenwich St., New York, N. Y.

BLAKE & Johnson Co., Waterbury, Conn.

BLANCHARD Machine Co., 64 State St., Cambridge, Mass.

BRASS & Aluminum Foundry & Machine Co., 364 Trombly St., Detroit, Mich.

BRIDGEPORT Engineering Co., Bridgeport, Conn.

BUDA Co., Harvey, Ill.

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O. (See page 345.)

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHESTERMAN & Streeter, 125 N. Seventh St., Philadelphia, Pa.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CLARK Novelty Co., 380 Exchange St., Rochester, N. Y.

CLEVELAND Ball Bearing Co., Cleveland, O. (See page 79.)

CLIMAX Machinery Co., 143-63 E. Morris St., Indianapolis, Ind.

CONOVER-OVERKAMP Machine & Tool Co., 841 W. Germantown St., Dayton, O.

COOPER Flexible Transmission Co., Eighth Ave. & 18th St., Brooklyn, N. Y.

CURRIE & Son, J. B., 72 Adams St., Brooklyn, N. Y.

DETLAFF, A. J., 121 Champlain St., Detroit, Mich.

DETROIT Gear & Machine Co., Detroit, Mich. (See page 187.)

DETROIT Motor Casting Co., 299-303 Beaufait Ave., Detroit, Mich.

DIAMOND Chain & Mfg. Co., 231 W. Georgia St., Indianapolis, Ind.

DIEBOLD Products Co., 5333-37 St. Clair Ave., Cleveland, O.

DITWILER Mfg. Co., Galion, O.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 527.)

EASTERN Machine & Stamping Co., 15 Wickenden St., Providence, R. I.

EASTON Contracting & Machine Co., 39 N. Sitgreaves St., Easton, Pa.

EDWARDS Co., B. V., 60 Shipman St., Newark, N. J.

ELECTRICAL Engineering & Storage Battery Co., Hume-Mansure Bldg., Sandy Hook, Conn.

FARMER Mfg. Co., Fordyce & Marston Sts., Detroit, Mich. (See page 311.)

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.

FORE River Shipbuilding Corp., Quincy, Mass.

FORT Dearborn Mfg. Co., 1574-80 Crossing St., Chicago, Ill.

FRIES & Co., Buffalo, N. Y.

FRONTIER Engineering Co., 816-36 Fort St., W., Detroit, Mich.

FROST Gear & Forge Co., Jackson, Mich. (See page 167.)

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

FULTON Mfg. Co., Erie, Pa.

GARRIGUS Machine Co., C. G., 151 Riverside Ave., Bristol, Conn.

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y.

Complete Index to Classification appears on Pages 8 to 26.

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MACHINE WORK (Continued)

SPECIAL MACHINE WORK TO ORDER (Continued)

GEIER Co., P. A., 5112 St. Clair Ave., E., Cleveland, O.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 429.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

GOETZ Co., 1802 Clybourn Ave., Chicago, Ill.

GOODSPEED-DETROIT Mfg. Co., 272-80 Harper Ave., Detroit, Mich.

GRANT Mfg. & Machine Co., Bridgeport, Conn.
(See page 517.)

GREENHALGH Engine & Machine Works, G. H., 550-52 Central Ave., Newark, N. J.

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn.
(See page 297.)

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HILES & Co., C. A., 14th St. & Western Ave., Chicago, Ill.

HOUPERT Machine Co., 351-55 W. 52d St., New York, N. Y.

HULL Mfg. Co., Lansing, Mich.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

INDIANAPOLIS Tool & Mfg. Co., Indianapolis, Ind.

JACOBSON Machine Mfg. Co., Warren, Pa.
(See page 483.)

JOHNSTON & Jennings Co., 877 Addison Rd., Cleveland, O.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KERMATH Mfg. Co., 45 Fort St. E., Detroit, Mich.

KIDDER-OSWALD Co., Dayton, O.

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

KRAHN Mfg. Co., 588 Clinton St., Milwaukee, Wis.

LEE Co., Wm. O., Port Huron, Mich.
(See page 111.)

LEWIS Spring & Axle Co., Jackson, Mich.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 135.)

LIMERICK Co., J. Arthur, 960 N. Howard St., Baltimore, Md.
(See page 349.)

LINK-BELT Co., 39th St. & Stewart Ave., Chicago, Ill.
(See page 155.)

LONG Machine Works, Adam A., Ave. E & St. Paul St., Rochester, N. Y.

LYCOMING Foundry & Machine Co., Williamsport, Pa.

MASSNICK-PHIPPS Mfg. Co., 1091 Champlain St., Detroit, Mich.

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y.

METROPOLITAN Mfg. Co., 12th St. & G. T. R. R., Detroit, Mich.

MILHOLLAND Machine Co., W. K., 29th & Canal Sts., Indianapolis, Ind.

MODERN Machinery Co., Monroe & Fifth Sts., Wilmington, Del.

MOORE & Co., 301 W. Grand Ave., Chicago, Ill.

MURRAY Machine Works, 1924 Wabansia Ave., Chicago, Ill.

NATIONAL Cycle & Mfg. Co., Bay City, Mich.

NATIONAL Engineering Co., Saginaw, Mich.
(See page 471.)

NATIONAL Sewing Machine Co., Belvidere, Ill.

NATIONAL Stamping & Electric Works, 410-26 Clinton St., Chicago, Ill.

NEW England Gear Works, 100 Purchase St., Boston, Mass.

NEWARK Stamping Co., Newark, O.
(See page 551.)

NILSON-MILLER Co., 13th & Hudson Sts., Hoboken, N. J.

OBENBERGER Drop Forge Co., Milwaukee, Wis.
(See page 475.)

OBERDORFER Brass Co., M. L., 804 E. Water St., Syracuse, N. Y.

OFFENHAEUSER & Dotsch, 41 Beekman Ave. (N. Tarrytown), Tarrytown, N. Y.

PETERS Machine & Mfg. Co., Whitney Power Bldg., Cleveland, O.

PIONEER Brass Works, Indianapolis, Ind.
(See page 211.)

PIPER Machine Co., 560-70 N. Elder Ave., Indianapolis, Ind.

PROSSER Engineering Co., 2106 W. Superior Ave., Cleveland, O.

PROVIDENCE Engineering Works, 521 S. Main St., Providence, R. I.

PURITAN Machine Co., 409-21 Lafayette Blvd., Detroit, Mich.

ROSS Machine Co., 208 S. Fourth St., La Fayette, Ind.

RUSSEL Wheel & Foundry Co., Detroit, Mich.

SAYRE Stamping Co., Sayre, Pa.

SCALLAN & Co., W. E., 1123-25 Gest St., Cincinnati, O.

SCHATZ Mfg. Co., 17 Fairview Ave., Poughkeepsie, N. Y.

SCOVILL Mfg. Co., 224 N. Lake St., Chicago, Ill.

SELIK Bros., 254-56 Meldrum Ave., Detroit, Mich.

SHIMER & Sons, Samuel J., Milton, Pa.

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 475.)

SLOAN & Chace Mfg. Co., Sixth Ave. & 13th St., Newark, N. J.

SMITH Mfg. Co., Philip, Sidney, O.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 289.)

STANDARD Engineering Works, 90 Exchange St., Pawtucket, R. I.

STANDARD Mfg. Co., 990 Housatonic Ave., Bridgeport, Conn.

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The Soft Touch of American Bushings

A BUSHING is a peculiar part of a machine. It is either very good or very bad—there can be no half-way quality. Before installed, no man can tell how perfect is its substance; how long it will endure; how smoothly it will run.

We specialize on Bushings—GOOD Bushings. It isn't a side line with us, because our future depends upon "repeat" orders—and these orders come only from **satisfied** users. So we use the finest Bearing Bronze and Babbitt; the grades that stand machining to the .0005 part of an inch. Bushings which combine with good oil to give that velvety touch, that clock-like stroke to your engine. And we carry 1600 stock patterns and sizes; thus you needn't worry about new patterns or tool changes.

As we do an enormous bushing business, we can produce them for less than you can buy the raw materials. Just send us your blue prints and we'll gladly submit estimates. Catalogue free on request.

American Car & Ship Hardware Manufacturing Company

Dept. T. **New Castle, Pa.**

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MACHINE WORK (Continued)

SPECIAL MACHINE WORK TO ORDER (Continued)

SUPERIOR Machine & Engineering Co., 51-53 Fort St., E., Detroit, Mich.

SWOPE-McCRACKEN Co., Elks Temple, Detroit, Mich.

T. C. M. Mfg. Co., Hunterdon & First Sts., Harrison, N. J.

TAFT-PEIRCE Mfg. Co., Woonsocket, R. I.

TANNER-HOWER Mfg Co., Akron, O.
(See page 491.)

TURNER & Moore Mfg. Co., 54 Champlain St., Detroit, Mich.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.

UNIVERSAL Mfg. Co., Racine, Wis.
(See page 243.)

UNIVERSAL Telegraphic Co., Baltimore, Md.

VOELKNER & Harry Mfg. Co., 282-92 Woodbridge St., E. Detroit, Mich.

WADE Machine Co., 817 Albany St., Boston, Mass.

WALKER Co., H. J., 40 Champlain St., Detroit, Mich.

WARNER Bros. Machine Works, High & Howard Sts., Muncie, Ind.

WEISS, L. T., 293 Taaffe Pl., Brooklyn, N. Y.
(See page 245.)

WEST & Dodge, 384 Atlantic Ave., Boston, Mass.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WESTINGHOUSE Machine Co., (E. Pittsburg), Pittsburg, Pa.

WILCOX-McKIM Co., Saginaw, Mich.

MAGNETOS

IGNITION MAGNETOS AND DYNAMOS

BERLING—See Ericsson Mfg. Co.

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

BRIGGS Magneto Co., Elkhart, Ind.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

EISEMANN Magneto Co., 32-33d St., Brooklyn, N. Y.
(See page 251.)

ELKHART Mfg. Co., First St. & Conant Ave., Monroe, Mich. "Monroe."

ERICSSON Mfg Co., 1121 Military Rd., Buffalo, N. Y. "Berling."

HEINZE Electric Co., Lowell Mass.
(See page 499.)

HERZ & Co., 245 W. 55th St., New York, N. Y. (Importers.)
(See page 303.)

K-W Ignition Co., 2833 Chester Ave., Cleveland, O.

KINGSTON—See Kokomo Electric Co.

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

MARBURG Bros., 1790 Broadway, New York, N. Y. (Importers.) "Mea."
(See page 423.)

MEA—See Marburg Bros.

MONROE—See Elkhart Mfg. Co.

NATIONAL Coil Co., Lansing, Mich.

REMY Electric Co., Anderson, Ind.
(See page 253.)

SIMMS Magneto Co., Bloomfield, N. J.

SPLITDORF Electrical Co., Newark, N. J.
(See page 277.)

SWISS Magneto Co., 3021-23 Michigan Ave., Chicago, Ill.

MAGNETS

PERMANENT MAGNETS

(For Magnetos)

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

LINDENBERG Steel Co., 90 West St., New York, N. Y. (Importers.)
(See page 525.)

MANIFOLDS

INTAKE AND EXHAUST MANIFOLDS

(Brazed and Welded Manifolds. For Cast Manifolds—See Castings)

A-Z Co., 530 W. 56th St., New York, N. Y.

AMERICAN Tube Bending Co., 5-9 Lawrence St., New Haven, Conn.
(See page 253.)

AMERICAN Tube Products Co., Euclid Ave., E., & Grand Trunk Ry., Detroit, Mich.

DIAMOND Mfg. Co., Detroit, Mich.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

JACOBS Co., F. L., 451 Guoin St., Detroit, Mich.

MILWAUKEE Valve Co., 139 Burrell St., Milwaukee, Wis.

NATIONAL Pipe Bending Co., River & Lloyd Sts., New Haven, Conn.

SANFORD Mfg. Co., F. C., 1235-41 Howard Ave., Bridgeport, Conn.

STANDARD Metal Mfg. Co., Newark, N. J.
(See page 213.)

STANDARD Metalwork Co., 22-40 Prospect St., Thompsonville, Conn.

STANDARD Tool & Mfg. Co., 72 Champlain St., Detroit, Mich.

STANDARD Welding Co., Cleveland, O.
(See Book Mark.)

UNITED Wire & Supply Co., 109 Summer St., Providence, R. I.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

Complete Index to Classification appears on Pages 8 to 26.

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EISEMANN

Simplicity in its most pronounced form is the keynote of the new Eisemann Type G4 water proof and dust proof magneto for four cylinder motors.

This instrument is made in the single ignition type only because through its wonderful efficiency at all speeds and because of its simplicity and dependability it does away entirely with any possible need for the dual construction.

While the process of simplification has been generously followed out through the entire construction of this latest Eisemann product it is perhaps more plainly apparent in the breaker mechanism than in any one other single unit.

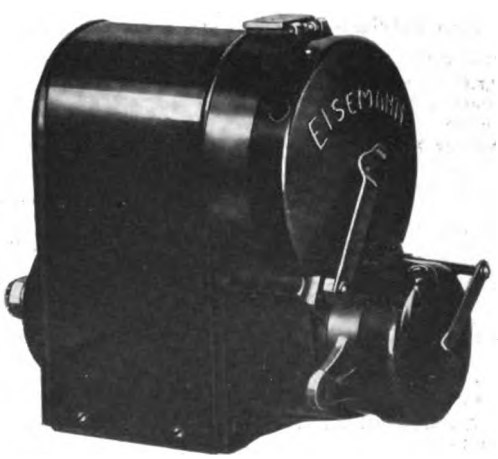
If you are interested in full information concerning the most marked development in the magneto field, write us for full descriptive matter concerning this Eisemann Type G4.

The
Eisemann Magneto Co.

Sales and General Offices
32-33d St., Brooklyn, N. Y.

New York
123 W. 52d St.
Indianapolis, Ind.
415-417 N. Capitol Ave.
Detroit, Mich.
802 Woodward Ave.

Introducing Type G4, a new Eisemann Magneto



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MANUFACTURERS AGENTS

(This is a list of Manufacturers Agents who advertise in this publication.)

FAW, J. H., 41 Warren St., New York, N. Y.
(See page 281.)

LYON, Edward F., 1003 Woodward Ave., Detroit, Mich.
(See page 259.)

MAPS

ROAD MAPS

AUTOMOBILE Blue Book Publishing Co., 243 W. 39th St., New York, N. Y.
(See page 541.)

BALDWIN Mfg. Co., 143 Federal St., Boston, Mass.

CALDWELL, Henry, 137 E. 16th St., New York, N. Y.

CHADWICK, L. S., 7309-609 Platt Ave., Cleveland, O.

CLASON Map Co., 1515 Tremont Pl., Denver, Colo.

DOVER Route Indicator Co., Occoquan, Va.

FARMER & Co., Silas, 29-31 Monroe Ave., Detroit, Mich.

HUEBINGERS—See Iowa Publishing Co.

IOWA Publishing Co., Fifth St. & Grand Ave., Des Moines, Ia. "Huebingers."

MENDENHALL, C. S., Race St., & Opera Pl., Cincinnati, O.

SCARBOROUGH Co., 338 N. Delaware Ave., Indianapolis, Ind.

WALKER Lithograph & Publishing Co., 400 Newbury St., Boston, Mass.

MATTING

ALUMINUM MATTING

ALUMINUM Co. of America, Pittsburg, Pa.

METALLIC Automobile Matting Co., Rochester, N. Y. "Pyrma."
(See page 259.)

PYRMA—See Metallic Automobile Matting Co.

MATS

COCOA MATS

DARRAGH & Small, 177 Water St., New York, N. Y.

HEYWOOD Bros. & Wakefield Co., 174 Portland St., Boston, Mass.

KEMPF & Son, Wm. F., 1027-33 N. Fourth St., Philadelphia, Pa.

McCABE & Bro., Benj., 37 E. 18th St., New York, N. Y.

RANCOCAS Mills, Trenton, N. J.

RUBBER MATS

ACME Rubber Mfg. Co., Trenton, N. J.

BOSTON Belting Co., 84 Linden Park St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass. "Lenox," "Tiger."

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 139.)

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

GOODRICH Co., B. F., Akron, O.

HAMILTON Rubber Mfg. Co., Trenton, N. J.
(See page 425.)

HOME Tire Co., Trenton, N. J.

LENOX—See Boston Woven Hose & Rubber Co.

MANHATTAN Rubber Mfg Co., Passaic, N. J.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

MILFORD Rubber Works, Milford, Ill.

MINERALIZED Rubber Co., 165 Chambers St., New York, N. Y.

MONARCH Rubber & Oil Cloth Co., Drexel Bldg., Philadelphia, Pa.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

THERMOID Rubber Co., Trenton, N. J.
(See page 55.)

TIGER—See Boston Woven Hose & Rubber Co.

VICTOR Rubber Co., Springfield, O.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.
(See page 355.)

STEEL MATS

WORTH Wire Works, Kokomo, Ind.

STEP OR RUNNING BOARD MATS

KAR KLEAN—See Specialty Mat Co.

KOKLIP—See Wilson & Co.

MOSLER & Co., A. R., Mt. Vernon, N. Y.
(See page 299.)

SPECIALTY Mat Co., 1 First St., Troy, N. Y. "Kar Klean."

WILSON & Co., F. Cortez, 323 W. Lake St., Chicago, Ill. "Koklip."

METALS

BEARING METALS

A. B. C. Castings Co., 6515 Carnegie Ave., S. E., Cleveland, O. "Meteor."

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GENERAL ALUMINUM AND BRASS MANUFACTURING COMPANY

BEARINGS

Manufacturers of the well-known Bronze Back Babbitt Lined (not die cast) automobile bearings. Designed also for electric motors and machine tools. Ask for copy of test of our bearings made by one of the leading automobile manufacturers on 32 h.p. motor running without lubrication under full load for 23 hrs. 35 min. An efficient engineering force for advice and design is at your disposal.

Plant No. 1 — **E. Grand Blv'd and St. Aubin Ave.**

Plant No. 2 — **184 Brush Street**

DETROIT

MANIFOLDS

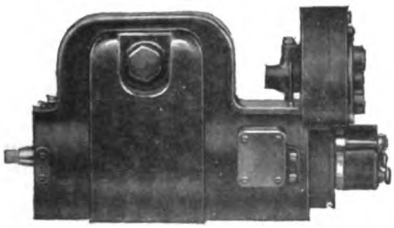
made from Copper, Brass, or Steel. Seamless tubing in any form desired for Water Inlets and Outlets, Gas Intakes, also Exhaust.
Submit blue prints and specifications to us for prices before placing your order.

AM. TUBE BENDING CO., Inc.
5-7-9 Lawrence St.,
NEW HAVEN, CONN.

Investigate the Remy Exchange Offer

Modernize Your Car

by equipping it with Electric Lights



Model 11.

The Model 11 Combined Lighting and Ignition Generator can be easily installed on the present magneto base and the same drive utilized.

A liberal allowance made for your present ignition system (any make) for either the model 11 Combined Lighting and Ignition Generator, or our latest Magneto.

REMY APPARATUS IS STANDARD

The Service Station nearest you will furnish all details. Write for address and catalogs.

REMY ELECTRIC COMPANY

World's Largest Factory Devoted to the Manufacture of Electrical Apparatus for Motor Car

LABORATORIES--FACTORIES--OFFICES

ANDERSON, INDIANA

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METALS (Continued)

BEARING METALS (Continued)

ACORN—See Cadman Mfg. Co.

ADAMANT—See Magnolia Metal Co.

ÆTNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

ALUMINUM Castings Co., 6217 Carnegie Ave., Cleveland, O. "Lynux."
(See page 99.)

AMERICAN Bronze Co., 1040-80 Non-Gran Blvd., Berwyn, Pa. "Non-Gran."
(See page opposite Inside Front Cover.)

AMERICAN Bronze Co., 90-108 Arthur St., Buffalo, N. Y. "Grainless."

AMERICAN Manganese Bronze Co., 99 John St., New York, N. Y. "Spare's."

ATKINSON Co., Rochester, N. Y. "Superior," "Plata."
(See page 315.)

AUTO-CRAT—See Syracuse Smelting Works.

AZALEA—See Vanadium Metals Co.

BIRKENSTEIN & Sons, S., 387-99 W. Ontario St., Chicago, Ill.
(See page 417.)

BLAKE, Edwin J., 565 Windsor St., Hartford, Conn.

BLATCHFORD Co., E. W., 230 N. Clinton St., Chicago, Ill.

BRASS & Aluminum Foundry & Machine Co., 364 Trombly St., Detroit, Mich.

BRIDGEPORT—See Monumental Bronze Co.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O.
(See page 345.)

CADMAN Mfg. Co., A. W., 2814-16 Smallman St., Pittsburg, Pa. "Acorn."

CARSON-ROWELL Co., Appleton, Wis.

COLORADO Lead Works Co., 1516 Blake St., Denver, Colo.

COLUMBIA Smelting & Refining Works, 365-67 West St., New York, N. Y.

CRAMP & Sons Ship & Engine Building Co., William, Philadelphia, Pa. "Parsons."
(See page 257.)

DAMASCUS Bronze Co., Pittsburg, Pa.

DAWSON Hardened Copper Co., S. R., 42 Broadway, New York, N. Y.

EDNA Brass Mfg. Co., 525-33 Reading Rd., Cincinnati, O.

ELECTRIC Smelting & Aluminum Co., Lockport, N. Y.
(See page 503.)

ELEPHANT—See Phosphor Bronze Smelting Co.

EMPIRE Metal Co., Syracuse, N. Y. "Premier," "Triumph."

EUREKA Brass Co., 2210-18 Scott Ave., St. Louis, Mo

EUREKA Co., North East, Pa.
(See page 255.)

FAHRIG Metal Co., 34 Commerce St., New York, N. Y.
(See page 475.)

FRICTIONLESS Metal Co., Chattanooga, Tenn.

GARDINER Metal Co., 1356-64 W. Lake St., Chicago, Ill.

GENERAL Aluminum & Brass Mfg. Co., E. Grand Blvd. & St. Aubin Ave., Detroit, Mich.
(See page 105 and 253.)

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn.
(See page 201.)

GRAINLESS—See American Bronze Co.

GREAT Western Smelting & Refining Co., 41st & Wallace Sts., Chicago, Ill.

HARPER, Thomas, 139 Lafayette St., New York, N. Y. "Hi-Servis."

HECLA—See Paulson & Son.

HENNING & Sons, V., 314-36 Belmont Ave., Brooklyn, N. Y.

HI-SERVIS—See Harper, Thomas.

HOWARD Metal Co., Second & Canal Sts., Reading, Pa.

HOYT Metal Co., 300 N. Broadway, St. Louis, Mo. "Trojan."
(See page 109.)

KAHN Bros., 775-97 Humboldt St., Brooklyn, N. Y.

LEHMAN Bros., 401-05 Jefferson St., Hoboken, N. J.

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 103.)

LISSBERGER & Son, Marks, 281 Borden Ave., Long Island City, N. Y.

LUMEN Bearing Co., Buffalo, N. Y.
(See page 191.)

LYNUX—See Aluminum Castings Co.

McGILL Metal Co., Valparaiso, Ind.

MAGNOLIA Metal Co., 113-15 Bank St., New York, N. Y. "Adamant."

MERCHANT & Evans Co., Philadelphia, Pa. "S. A. E."

METEOR—See A. B. C. Castings Co.

MOGUL Metal Co., Detroit, Mich.
(See page 109.)

MONUMENTAL Bronze Co., 354 Howard St., Bridgeport, Conn. "Bridgeport."

MORE-JONES Brass & Metal Co., 3132-44 N. Broadway, St. Louis, Mo.

MUZZY-LYON Co., Detroit, Mich.
(See page 109.)

NATIONAL Lead Co., New York, N. Y.
(See page 215.)

NEW Era Mfg. Co., Kalamazoo, Mich.

NON-GRAN—See American Bronze Co.

NORTH American Smelting Co., Ninth & Thompson Sts., Philadelphia, Pa. "Vulcan." "Philadelphia."

PARSONS—See Cramp & Sons.

PAULSON & Son, Thomas, 97 Second Ave., Brooklyn, N. Y. "Hecla."
(See page 257.)

PHILADELPHIA — See North American Smelting Co.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant."
(See page 471.)

PIONEER Brass Works, Indianapolis, Ind.
(See page 211.)

PITTSBURGH White Metal Co., 3116 Penn Ave,. Pittsburg, Pa.

PLATA—See Atkinson Co.

PREMIER—See Empire Metal Co.

Complete Index to Classification appears on Pages 8 to 26.

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Eureka Cored and Solid Bars

PHOSPHOR BRONZE BUSHINGS

The sizes most commonly used are:

O. D. Inches	I. D. Inches	Average Wt. Lbs.
3/4	Solid	1 3/4
1	1/2	2 1/4
1 1/4	5/8	3 1/2
1 3/8	3/4	4
1 1/2	3/4	5
1 5/8	7/8	5 1/2
1 3/4	1	6 1/4
2	1 1/8	8 1/4
2 1/4	1 3/8	10
2 1/2	1 5/8	11

We furnish Solid Bars of any diameter and Cored Bars of any size without additional charge for Patterns.

The durability and antifriction qualities of Eureka Bronze are unexcelled. It is the most successful metal for bearing purposes on the market, giving the greatest resistance to wear, and the least amount of friction. It increases the efficiency and life of the bearings.

THE EUREKA COMPANY, North East, Penn'a.

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METALS (Continued)

BEARING METALS (Continued)

REEVES & Co., Paul S., 1415-25 Catharine St., Philadelphia, Pa.

S. A. E.—See Merchant & Evans Co.

SANFORD Co., David C., 33-39 Tulip St., Bridgeport, Conn.

SEMPER IDEM—See Wildes Son.

SHONBERG, I., 122 Flushing Ave., Brooklyn, N. Y.

SPARE'S—See American Manganese Bronze Co.

STANLEY—See Syracuse Smelting Works.

SUPERIOR—See Atkinson Co.

SYRACUSE Smelting Works, Jewell St., Brooklyn, N. Y. "Auto-Crat," "Stanley."

TRIUMPH—See Empire Metal Co.

TROJAN—See Hoyt Metal Co.

VAN WAGNER Mfg. Co., E. B., Syracuse, N. Y.
(See page 101.)

VANADIUM—See Enterprise Metal Co.

VANADIUM Metals Co., Vanadium Bldg., Pittsburgh, Pa. "Azalea."

VULCAN—See North American Smelting Co.

WHITEHOUSE LeCompte Mfg. Co., 42-54 Elm St., Newark, N. J.
(See page 509.)

WILDES Son, Thomas, New York, N. Y. "Semper Idem."

WILLIAMS & Son, E. A., 105-11 Plymouth St., Jersey City, N. J.

WING & Co., J. T., 15-19 Woodward Ave., Detroit, Mich.

ZENITE Metal Co., 518 N. Capitol Ave., Indianapolis, Ind.

PERFORATED METALS

BECKLEY Perforating Co., C. R. R. R. Ave., Garwood, N. J.

CHICAGO Perforating Co., 2445 W. 24th Pl., Chicago, Ill.

ERDLE Perforating Co., 7 Factory St., Rochester, N. Y.

HARRINGTON & King Perforating Co., 632 N. Union St., Chicago, Ill.

HENDRICK Mfg. Co., Carbondale, Pa.

MANHATTAN Perforated Metal Co., 237-39 Centre St., New York, N. Y.

MUNDT & Sons, Chas., 53-57 Fairmount Ave., Jersey City, N. J.

NORTMANN-DUFFKE Foundry Co., 27th Ave. & N. W. R. R., Milwaukee, Wis.

METERS

COMPRESSION METERS

(See Gauges, Cylinder Compression)

DISTANCE RECORDING METERS OR ODOMETERS

(For combined Odometers and Speedometers—See Speedometers)

BAUMGAERTNER, F., 2344 E. 105th St., Cleveland, O. "Coronet."

CORONET—See Baumgaertner, F.

CORONET Mfg. Co., 168 Church St., New York, N. Y.

JONES Speedometer Co., Bush Terminal, Brooklyn, N. Y.

STAR Speedometer Co., Milton, Pa.

TRANSIMETER Co., 735 Seventh Ave., New York, N. Y.

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

GRADE METERS

ADAMS Co., Dubuque, Ia. "Gradometer."

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

AUTOCRAT—See American Thermo Ware Co.

GRADOMETER—See Adams Co.

WEINHAGEN, H., 159-65 Leonard St., New York, N. Y.

HEAT INDICATING METERS

(For attachment to radiator to show temperature of cooling water)

BOYCE MOTOMETER—See Motometer Co.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

FOWLER Motor Thermometer Co., Pierce Bldg., St. Louis, Mo.

MOTOMETER Co., 1790 Broadway, New York, N. Y. "Boyce Motometer."
(See page 399.)

STANDARD Thermometer Co., 65 Shirley St., Boston, Mass.
(See page 403.)

SPEED METERS

(See Speedometers)

TAXI METERS

(See Taximeters)

MICA

AMERICAN Mica Co., Newton Lower Falls, Mass.

ASHEVILLE Mica Co., Asheville, N. C.

CHICAGO Mica Co., Valparaiso, Ind.

DIELECTRIC Mfg. Co., 224 S. Vandeventer Ave., St. Louis, Mo.

GRANITE State Mica Co., Old South Bldg., Boston, Mass.

MICA Mfg. Co., 150-52 Chambers St., New York, N. Y.

MUNSELL & Co., Eugene, 68 Church St., New York, N. Y.

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BRONZE

ANTI-FRICTION

A bearing Bronze which DOES NOT CUT

Cored Bars and *Solid Rods* in a variety of sizes suited to the requirements of the repair shop and manufacturer.

"HECLA" BRONZE possesses those properties so essential to a metal used for bearing purposes.

It DOES NOT CUT **It will not POUND OUT or BREAK**
It machines at a LOW COST

Bearings of this material have a reputation for long life and freedom from friction. The convenient form in which it is stocked appeals to the repairman.

"HECLA" BRONZE is not the lowest priced bearing bronze and there are other bronzes priced much higher. Irrespective of price per pound, you will find this material the most economical, all points considered.

The composition of this bronze is UNIFORM at all times. Only the best materials are used in producing the alloy.

We make the claim emphatically, that "HECLA" BRONZE has *no superior*, regardless of price.

Castings and *machined parts* will be furnished from your patterns or sketches.

THOMAS PAULSON & SON, Inc.
97 Second Ave. **Brooklyn, N. Y.**

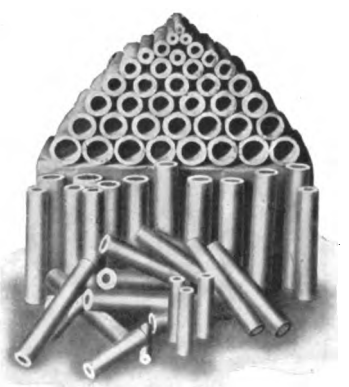
CRAMP

CORED BARS FOR BUSHINGS

Furnished either in PARSONS' WHITE BRASS or CRAMP'S SPECIAL BEARING BRONZE. Sizes of bars not shown in the list and cored whole and half bushings with end collars can be furnished from stock patterns. In ordering refer to the number in first column.

PARSONS' WHITE BRASS for main engine and crank pin bearings.

CRAMP'S SPECIAL BEARING BRONZE for wrist pin, cam-shaft, transmission bearings, valve stem guides and similar bearings.



List of cored and solid cast bars of our bearing metals in stock:

	Outside Diameter. Inches.	Inside Diameter. Inches.	Length. Inches.
1.....	1	½	6
2.....	1¼	½	6
3.....	1½	¾	12
4.....	1¾	¾	12
5.....	1¾	1	12
6.....	2	1	12
7.....	2	1¼	12
8.....	2¼	1	12
9.....	2¼	1¼	12
10.....	2½	1¼	12
11.....	2½	1½	12
12.....	2¾	1½	12
13.....	2¾	1¾	12
14.....	3	2	12
15.....	3	2¼	12
16.....	3¼	2¼	12
17.....	3¼	2½	12

Solid bars up to 2 inches diameter.

THE WILLIAM CRAMP & SONS SHIP AND ENGINE BUILDING CO.
PHILADELPHIA, PA.

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MICA (Continued)

NEW York Mica & Mfg. Co., Auburn, N. Y.

PRESTON Co., Robert K., Monadnock Bldg., Chicago, Ill. "Prestonite."

PRESTONITE—See Preston Co.

SCHOONMAKER Co., A. O., 88 Park Pl., New York, N. Y.

SNOW FLAKE—See Western Mica Mining & Milling Co.

TAR Heel Mica Co., Plumtree, N. C.

UNITED Mica Co., Grafton Center, N. H.

WATSON Bros., 170 Purchase St., Boston Mass.

WESTERN Mica Mining & Milling Co., W. 16th Ave. & Bryant St., Denver, Colo. "Snow Flake."

MIRRORS

ADJUSTABLE DASHBOARD MIRRORS

(To enable driver to see to the rear of the car)

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y. "Mirrorscope."

AMERICAN Lamp Works, 253 W. 47th St., New York, N. Y. "Liberty."

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

ANSONIA Mfg. Co., Ansonia, Conn.

ARGOS—See Motor Car Equipment Co.

AUTO Specialty Co., 416-18 N. Sycamore St., Santa Ana, Cal.

AUTOCRAT—See American Thermo Ware Co.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

COX Brass Mfg. Co., Albany, N. Y. "Reflectorscope."
(See page 511.)

GOODWIN & Kintz Co., Winsted, Conn.

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y.

HOCO—See Hoeft & Co.

HOEFT & Co., Ashland Ave. & Kinzie St., Chicago, Ill. "Hoco."

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

LIBERTY—See American Lamp Works.

MIRRORSCOPE—See Alexander Mfg. Co.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers.) "Argos."

PLATO Art Co., 315 Church St., New York, N. Y.
(See page 259.)

REFLECTORSCOPE—See Cox Brass Mfg. Co.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

SMITH, H. Lund, 199-203 Paterson St., Paterson, N. J.

STANDARD Spinning & Stamping Co., 2238 Smead Ave., Toledo, O.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WHITEHOUSE LeCompte Mfg. Co., 42-54 Elm St., Newark, N. J.
(See page 509.)

WATER GAUGE MIRRORS

KNOX Co., Frank J., Hartford, Conn.

MIXERS

FUEL MIXERS, ECONOMIZERS OR AGITATORS

AERO-MATIK Gas Saver Co., 907 N. Broad St., Philadelphia, Pa.

AMERICAN Automobile Specialty Co., 510 S. Ashland Blvd., Chicago, Ill. "Vigor."

AMERICAN Compensating Valve Co., 630 18th St., Manitowoc, Wis.

ANSONIA Mfg. Co., Ansonia, Conn.

AUTOMATIC Device Co., 551 E. Jefferson St., Frankfort, Ind. "Economy."

AUTOMIZER Co., City Natl. Bank Bldg., Canton, O.

BEITMAN & Co., I. B., Security Bldg., Chicago, Ill.

BINGHAM Mfg. Co., 227 Prospect Ave., N. W., Cleveland, O. "G. L."

BOUCHER Mfg. Co., H. E., 150 Lafayette St., New York, N. Y. "Helix."

BREMER-WILSON Mfg. Co., 1421 Michigan Ave., Chicago, Ill. "Triplex."

BRESLER-WALLACE Sales Co., 1031 Dime Bank Bldg., Detroit, Mich. "Wiard."
(See page 329.)

BROWN-TAYLOR-GREENE Co., 1323-25 S. Michigan Ave., Chicago, Ill. "Empire."

BURLEIGH, Geo K., Penacook, N. H.

BUSHEY, E. J., 1790 Broadway, New York, N. Y.

CLEMMER, G. H., West Alexandria, O.

CRARY Co., 650-52 Woodward Ave., Detroit, Mich.

CRONE, F. G., 334 Genesee St., Buffalo, N. Y.

DEPPE, W. P., 127 Duane St., New York, N. Y. "Stanley."

ECONOMY—See Automatic Device Co.

ECONOMY Gas Vaporizer Co., 6 E. Maumee St., Adrian, Mich.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill. "Jumbo."

EMPIRE—See Brown-Taylor-Greene Co.

G. L.—See Bingham Mfg. Co.

GAS Saver Sales Co., 1790 Broadway, New York, N. Y. "Gasosava."

GASIFTER—See Toledo Auto Devices Co.

GASOSAVA—See Gas Saver Sales Co.

HELIX—See Boucher Mfg. Co.

HINE-WATT Mfg. Co., 180 N. Market St., Chicago, Ill. "Sly."

JEWELL Auto Devices Co., Frankfort, Ind.

JOHNSON Economizer Co., Henry B., 1433 Spring Garden St., Philadelphia, Pa.

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I SPECIALIZE ON

Spring and Axle Shafts

FOR ALL CARS, AND REPAIRS FOR LEWIS AXLES

Write for Prices

EDWARD F. LYON, Distributor FOR THE LEWIS SPRING AND AXLE COMPANY

1003 Woodward Ave., Detroit, Mich.

PYRMA

ALUMINUM MATTING

STRONGEST IN SERVICE AND LOWEST IN COST

Stock sizes for 50 ft. rolls are 9, 10, 12, 14, 15, 18 and 20 inch widths; for 24 ft. rolls 24, 30 and 36 inch widths. Of course special lengths and widths can always be supplied.

ALUMINUM MOULDING

J-shape running board moulding in 10 to 14 ft. lengths in stock for immediate delivery.

ALUMINUM HEEL PLATE

Made of special extra heavy aluminum that lasts longer than the car.

Write for samples of matting and moulding.

Manufacturers—Get our attractive prices on quantity lots of matting, moulding or heel plates—all made of aluminum.

Dealers and Jobbers—Good profits are yours—if you push these articles.

WRITE—TODAY—FOR SAMPLES.

METALLIC AUTOMOBILE MATTING COMPANY

Rochester New York

Transparent and Clear as Glass

Flexible and Tough as Canvas

PYRALIN TRANSPARENT SHEETING

Full Particulars Upon Request

THE ARLINGTON COMPANY 725-727 Broadway, New York

BOSTON PHILADELPHIA CHICAGO SAN FRANCISCO ST. LOUIS DETROIT

Go Ahead, But See What's Back Of You

It is just as necessary in careful driving to see what is behind you as it is to have a clear view ahead.

The "MIRRORED HAND" enables you to watch everything in the rear, without distracting your attention from the road ahead.

25c. is the price of this SAFETY FIRST device, consisting of high-grade diminishing mirror, with patented arrangement for easy attachment. At your dealer's, or we will mail on receipt of price. Special inducements to dealers. Unsurpassed as an advertising novelty, as the entire back is available for ads, printed in one or more colors.

For further information, write

PLATO ART CO., 315 Church St., near Lispenard, New York

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MIXERS (Continued)

FUEL MIXERS, ECONOMIZERS OR AGITATORS (Continued)

JONES & Buckoke, 1413 Michigan Ave., Chicago, Ill.

JUMBO—See Edelmann & Co.

KERO-MIX—See Patterson, F. W.

KERNODLE-M'DANIEL Co., Frankfort, Ind.

LYDON Mfg. Co., 1514 Michigan Ave., Chicago, Ill. "Speedler."

M & M Sales Co., Lewistown, Pa.

MARTIN Shock Absorber Corp., 1301-1401 E. Slauson Ave., Los Angeles, Cal.

MICHENER, E. S., 80 Washington St., New Castle, Pa.

MOTOMETER Co., 1790 Broadway, New York, N. Y.
(See page 399.)

MYSTIC—See Perkins Appliance Co.

NEW YORK Coil Co., 338-40 Pearl St., New York, N. Y. "Nyco."

NYCO—See New York Coil Co.

OATHOUT, Chas. M., Saugerties, N. Y.

PAR-KOP Mfg. Co., Broad St. & Ridge Ave., Philadelphia, Pa. "Parker."

PARKER—See Par-Kop Mfg. Co.

PATTERSON, F. W., 836 E. 43d St., Chicago, Ill. "Kero-mix."

PECK, E. C., 432 Third St., San Bernardino, Cal.

PEERLESS Motor Specialty Co., 1779 Broadway, New York, N. Y.

PERKINS Appliance Co., 539 Worthington St., Springfield, Mass. "Mystic."

PERPETUAL—See Ratliff, Sidney A.

PROGRESSIVE Mfg. Co., 468 64th Ave. (W. Allis), Milwaukee, Wis.

RATLIFF, Sidney A., Main St., Riverside, Cal. "Perpetual."

ROYAL-SILENT Motor Co., Los Angeles, Cal.

S. P. Vaporizer Co., 125 E. 23d St., New York, N. Y.

SAUNDERS Co., Leslie R., 1250-60 W. Seventh St., Los Angeles, Cal.

SIRENO Co., 18-20 Rose St., New York, N. Y. "Votex."

SLY—See Hine-Watt Mfg. Co.

SPEEDLER—See Lydon Mfg. Co.

STANLEY—See Deppe, W. P.

STEWART Machine Works, Alfred C., Tenth & Santee Sts., Los Angeles, Cal.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "Gasifter."

TRIPLEX—See Bremer-Wilson Mfg. Co.

VIGOR—See American Automobile Specialty Co.

VOTEX—See Sireno Co.

WIARD—See Bresler-Wallace Sales Co.

WILSON Vaporizer Co., Roslyn, Pa.

MOISTENERS

AIR OR MIXTURE MOISTENERS

(For feeding water into the intake manifold)

AXTELL, F. C., Marsh-Strong Bldg., Los Angeles, Cal.

BALZER & Son, Andover, N. J. "Powac."

MOTOR-ECONOMY Co., 169 Massachusetts Ave., Boston, Mass.

POWAC—See Balzer & Son.

SHUMAKER Motor Car Co., J. T., 383 Canterbury Rd., Rochester, N. Y.

MONOGRAMS

ORNAMENTAL METAL MONOGRAMS

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

BERNARD Co., J., 422-30 E. 53d St., New York, N. Y.

CHILDS & Co., S. D., 376 W. Monroe St., Chicago, Ill.

COLGAN Co., J. W., Sudbury Bldg., Boston, Mass.

CREUTZ Plating Co., Fifth & Elm Sts., Cincinnati, O.

CROWE Name Plate & Engraving Co., Chicago, Ill.
(See page 291.)

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

GREENDUCK Co., 2127 Tilden Ave., Chicago, Ill.

HANDEL Co., Louis, 138 Center St., New York, N. Y.

HANSON, C. H., 178 N. Clark St., Chicago, Ill.

HICKOK Mfg. Co., 38 St. Paul St., Rochester, N. Y.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

JOHNSTON Co., J. G., 79 Sudbury St., Boston, Mass.

MATTHEWS & Co., Jas. H. (Forbes Field), Pittsburg, Pa.

MURDOCK, Jr. Co., James, 116 Opera Pl., Cincinnati, O.

NEW YORK Stencil Works, 100 Nassau St., New York, N. Y.

REES, F. H., Granite Bldg., Rochester, N. Y.

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

SALMAN, John A., 17-21 Bromfield St., Boston, Mass.

SCHRIDDE, Wm., 35 S. Clark St., Chicago, Ill.

SCHWERDTLE Stamp Co., 39-41 Cannon St., Bridgeport, Conn.

STAFFORD Co., N., 67 Fulton St., New York, N. Y.

WALTER & Sons, N. C., 3 Park Row, New York, N. Y.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

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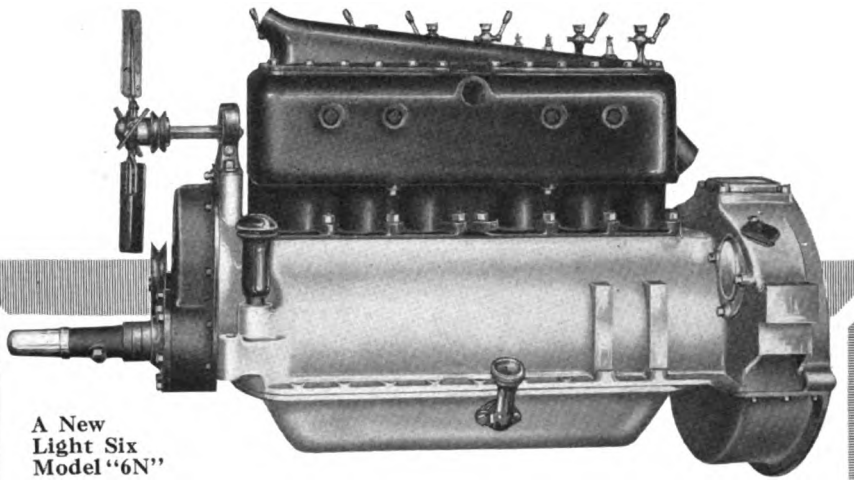

A New
Light Six
Model "6N"

The best that can be said for a motor is that it has kept its friends. There are several manufacturers building popular cars who have used Continental Motors continuously since they began business.

Continental Motors

CONTINENTAL MOTORS · Power for the Nation · AMERICA'S STANDARD

Continental Customers have learned to expect

HIGH QUALITY—SURE DELIVERY—SALES PRESTIGE.

These certainties insure them against production holdups and practically guarantee them a certain volume of sales.

Motors for pleasure or commercial cars in the following sizes:—

FOURS:

Model U.....2¾ x 4
Model N.....3½ x 5
3¾ x 5
Model C.....3¾ x 5¼
4⅛ x 5¼
Model E.....4½ x 5½
Model T.....5 x 5¾
5¼ x 5¾

SIXES:

Model 6N.....3½ x 5
Model 6P.....3¾ x 5¼
Model 6C.....4⅛ x 5¼

CONTINENTAL MOTOR MFG. CO.

Largest exclusive automobile motor builders in the world

Detroit, Michigan. **Factories at Detroit and Muskegon**

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UPHOLSTERY MOSS

BABIN, Luke B., White Castle, La.

KOHLMANN Moss & Cotton Felt Mfg. Co., 1224-30 St. Thomas St., New Orleans, La.

WOLL & Sons Mfg. Co., Peter, Hancock & Berks Sts., Philadelphia, Pa.

MOTORS

ELECTRIC AUTOMOBILE MOTORS

DIEHL Mfg. Co., Elizabethport, N. J. (See page 157.)

GENERAL Electric Co., Schenectady, N. Y.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg) Pittsburg, Pa.

GASOLINE AUTOMOBILE MOTORS

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

AUTOPARTS Mfg. Co., Detroit, Mich.

BEAVER Mfg. Co., 2502 First Ave., Milwaukee, Wis.

BINSSE Machine Co., Harrison, N. J. "Howard."

BRENNAN Motor Co.. 105 Grape St., Syracuse, N. Y.

BUDA Co., Harvey, Ill.

CHRISTENSEN Engineering Co., 841-47 30th St., Milwaukee, Wis.

CONTINENTAL Motor Mfg. Co., Detroit, Mich. (See page 261.)

CRESCENT Motor Co., Cincinnati, O.

CROSS Gear & Engine Co., Detroit, Mich. (See page 307.)

DART Motor Truck Co., Ainsborough & Stratford Aves., Waterloo, Ia.

DAVIS Mfg. Co., 15th Ave. & Park St., Milwaukee, Wis. (See page 401.)

DICE Engine Co., 50 W. 16th St., Anderson, Ind.

ERGON—See Hazard Motor Mfg. Co.

FALLS Machine Co., Sheboygan Falls, Wis.

FARMER Mfg. Co., Fordyce & Marston Sts., Detroit, Mich. (See page 311.)

FITZ-HUGH, Luther, Engineering Co., Lytton Bldg., Chicago, Ill.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRISBIE Motor Co., 56 College St., Middletown, Conn.

GOLDEN, Belknap & Swartz Co., 1248 Grand River Ave., Detroit, Mich.

HAZARD Motor Mfg. Co., Rochester, N. Y. "Ergon."

HERSCHELL-SPILLMAN Co., North Tonawanda, N. Y. (See page 495.)

HOOSIER Motor Co., Goshen, Ind.

HOOVEN, Owens, Rentschler Co., Hamilton, O.

HOWARD—See Binsse Machine Co.

LYCOMING Foundry & Machine Co., Williamsport, Pa.

LYONS Atlas Co., Indianapolis, Ind. (See page 357.)

METAL Products Co., Decatur, Ind.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MONARCH Motor Mfg. Co., 3145-53 N. Halsted St., Chicago, Ill.

N. P. Motor Co., 817 Monadnock Bldg., Chicago, Ill. (See page 507.)

NORTHWAY Motor & Mfg. Co., 510-14 Maybury Grand Ave., Detroit, Mich.

OULTON Motor & Mfg. Co., 311 Atlantic Ave., Boston, Mass.

PALMER-MOORE Co., 100 N. Geddes St., Syracuse, N. Y.

PENINSULAR Auto Parts Co., Lafayette Ave., E., Detroit, Mich.

PITTSBURGH Model Engine Co., Pittsburgh, Pa. (See page 401.)

PORT HURON Construction Co., Port Huron, Mich.

REGAL Gasoline Engine Co., Coldwater, Mich.

ROBERTS Motor Co., 1435 Columbus Ave., Sandusky, O.

ROCHESTER Motors Co., 5 Wren St., Rochester, N. Y.

ROCKEFELLER Engine Co., Central Ave. & E. 65th St., Cleveland, O.

RUTENBER Motor Co., Marion, Ind. (See page 265.)

SCHLOSSER Mfg. Co., 151 E. 126th St., New York, N. Y.

SOMMER Motor Co., Bucyrus, O.

STERLING Motor Co., 1145 W. Grand Blvd., Detroit, Mich.

TEETER-HARTLEY Motor Co., Hagerstown, Ind.

TREBERT Engine Works, H. L. F., 495 St. Paul St., Rochester, N. Y.

WARNER-DETROIT Motor Works, Dime Savings Bank Bldg., Detroit, Mich.

WARNER Mfg. Co., Toledo, O. (See page 405.)

WAUKESHA Motor Co., Waukesha, Wis. (See page 437.)

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

WISCONSIN Motor Mfg. Co., Station A., Milwaukee, Wis. (See page 263.)

YALE Steel Stamping Co., Oostburg, Wis.

GASOLINE CYCLECAR MOTORS

BEAVER Mfg. Co., 2502 First Ave., Milwaukee, Wis.

CLARK Engine & Boiler Co., Kalamazoo, Mich.

DE LUXE—See Spacke Machine Co.

FARMER Mfg. Co., Fordyce & Marston Sts., Detroit, Mich. (See page 311.)

HERRMAN Engineering Co., 265 Jefferson Ave., Detroit, Mich.

IVES Motorcycle Corp., Owego, N. Y.

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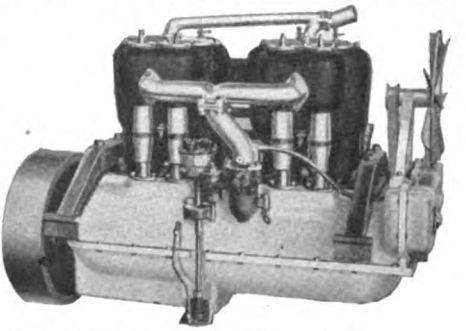
Up to the Top Without a Stop

That's the way any motor truck will take any hill if there is a sturdy

Wisconsin Motor

CONSISTENT

under the hood. No matter how steep the grade—no matter what the condition of the road, Wisconsin motors will do the work surely, consistently, powerfully and without slipping or stalling. They are specially built for heavy loads, rough roads, sand and mud, and can always be relied upon to keep going when most needed—a point where many motors stop.



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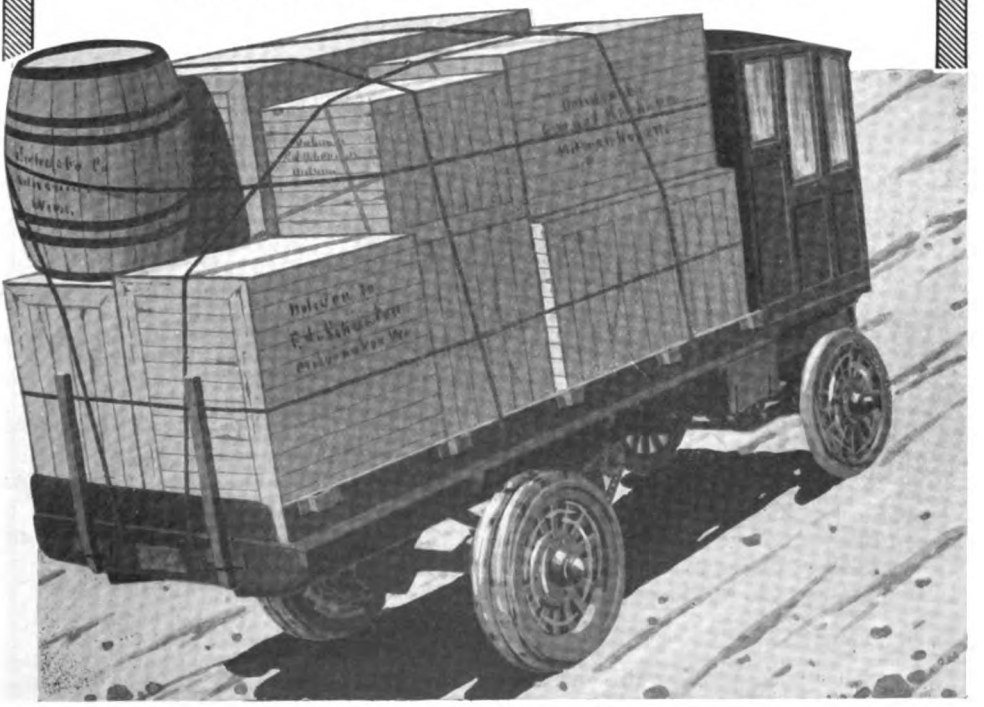
Station A, Dept. 132 MILWAUKEE, WISCONSIN



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MOTORS (Continued)

GASOLINE CYCLECAR MOTORS (Continued)

KEMP Machine Works, 1215 S. Franklin St., Muncie, Ind.

LYCOMING Foundry & Machine Co., Williamsport, Pa.

MACK—See Universal Machinery Co.

MASSNICK-PHIPPS Mfg. Co., 1091 Champlain St., Detroit, Mich.

MOTOR Products Co., Dodge Bldg., Detroit, Mich.

N. P. Motor Co., 817 Monadnock Bldg., Chicago, Ill. (See page 507.)

O. B.—See Universal Mfg. Co.

OAKBROOK Motor Mfg. Co., Angelica & Wood Sts., Reading, Pa.

REX Motor Co., Labadie St. (Ford City), Wyandotte, Mich.

ROCHESTER Motors Co., 5 Wren St., Rochester, N. Y.

SPACKE Machine Co., F. W., Indianapolis, Ind. "De Luxe." (See page 289.)

THORNE Motor Co., 654 Franklin St., Detroit, Mich.

UNIVERSAL Machinery Co., 1910-20 St. Paul Ave., Milwaukee, Wis. "Mack."

UNIVERSAL Mfg. Co., 308-10 Ninth St., S., Minneapolis, Minn. "O. B."

WIZARD Motor Co., 222 W. Merrill St., Indianapolis, Ind.

STEAM AUTOMOBILE MOTORS

(See Engines, Steam)

MOULDING

BRASS MOULDING

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 319.)

COWLES & Co., C., New Haven, Conn. (See page 463.)

DOUGLAS & Lomason Co., Detroit, Mich. (See page 205.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

JONAH & George, Merrimac, Mass.

KINSEY Mfg. Co., Toledo, O.

MANHATTAN Brass Co., 328 E. 28th St., New York, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

RANDOLPH-CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

SMITH & Co., Jos. N., Detroit, Mich. (See page 203.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

RUNNING BOARD MOULDING

(See also Moulding, Brass; also Moulding, Steel)

ALITE—See Zenite Metal Co.

ALUMINUM Co. of America, Pittsburg, Pa.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 319.)

DAHLSTROM Metallic Door Co., 36 Blackstone Ave., Jamestown, N. Y.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

METALLIC Automobile Matting Co., Rochester, N. Y. (See page 259.)

SMITH & Co., Jos. N., Detroit, Mich. (See page 203.)

UNITED States Metal Products Co., 111 Broadway, New York, N. Y. (See page 83.)

WATERBURY Brass Goods Corp., 160 Washington Ave., Waterbury, Conn.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

ZENITE Metal Co., 518 N. Capitol Ave., Indianapolis, Ind. "Alite."

STEEL MOULDING

DAHLSTROM Metallic Door Co., 36 Blackstone Ave., Jamestown, N. Y.

MUFFLERS

EXHAUST MUFFLERS

A-Z Co., 530 W. 56th St., New York, N. Y.

ANTI-EXPLO—See Garage Equipment Mfg. Co.

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

BRISCOE Mfg. Co., Detroit, Mich.

BRISKIN Mfg. Co., 539 N. Capitol Ave., Indianapolis, Ind.

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

BYRNE, Kingston & Co., 1040 Webster St., Kokomo, Ind. "Kingston."

CONSOLIDATED Gas & Electric Co., 552 W. Lake St., Chicago, Ill. "Non-Clog."

DUNKIRK Corporation, Dunkirk, N. Y. "Ejector."

EJECTOR—See Dunkirk Corp.

EVERETT Mfg. Co., 162-64 N. May St., Chicago, Ill.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Anti-Explo," "Gemco." (See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich.

HAYES Mfg. Co., Detroit, Mich.

JANNEY, Steinmetz & Co., Philadelphia, Pa. (See page 399.)

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y. (See page 199.)

KINGSTON—See Byrne, Kingston & Co.

KINSEY Mfg. Co., Toledo, O. "Kinwood."

KINWOOD—See Kinsey Mfg. Co.

LAWSON Co., F. H., Cincinnati, O. "Yale."

MAXIM Silencer Co., 60 Huyshope Ave., Hartford, Conn.

Complete Index to Classification appears on Pages 8 to 26.

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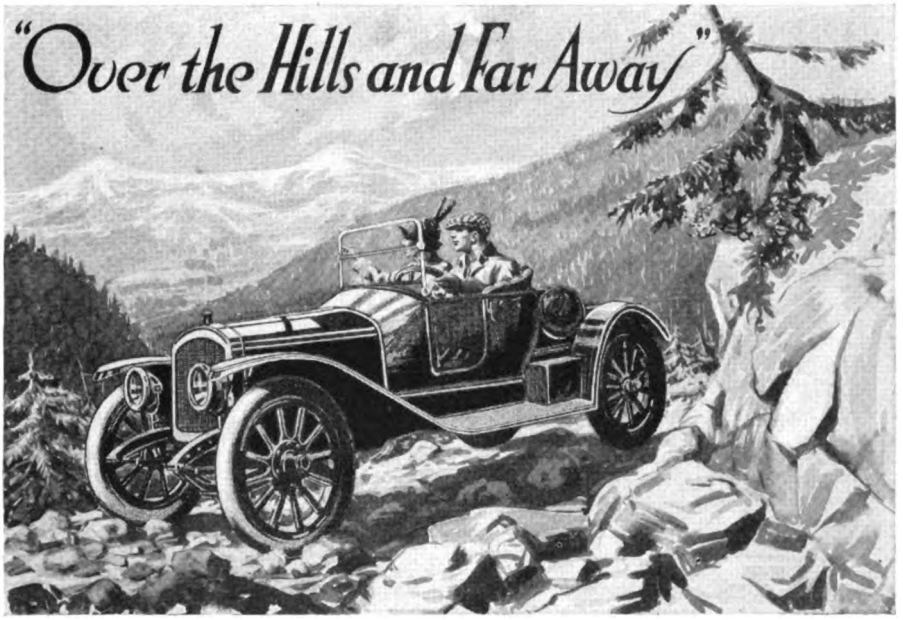

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MUFFLERS (Continued)

EXHAUST MUFFLERS (Continued)

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

NON-CLOG—See Consolidated Gas & Electric Co.

OLDBERG Mfg. Co., Detroit, Mich. (See page 267.)

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y. (See page 435.)

ROCK, John G., 452 W. Lincoln Ave., Mt. Vernon, N. Y.

SANFORD Mfg. Co., F. C., 1235-41 Howard Ave., Bridgeport, Conn.

TROIKE Muffler & Mfg. Co., Lorain, O.

XARDELL Bros. Co., 28 Broadway, Utica, N. Y.

YALE—See Lawson Co.

YANKEE Co., 69 Genesee St., Utica, N. Y.

THROAT MUFFLERS

BRADLEY Knitting Co., Delavan, Wis.

SCOTT Knitting Co., 1021 Gallia St., Portsmouth, O.

WAY Muffler Co., 23d & Arch Sts., Philadelphia, Pa.

NAILS

UPHOLSTERY NAILS

(See Tacks, Upholstery)

NIPPLES

PIPE NIPPLES

(See Fittings, Pipe)

PUMP NIPPLES

(See Connections, Tire Pump)

NUMBERS

LAMP NUMBERS

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

LICENSE NUMBERS OR HANGERS

(For License Holders—See Holders, License)

ALUMINUM Goods Mfg. Co., Manitowoc, Wis.

BALTIMORE Enamel & Novelty Co., ft. Allen St., Baltimore, Md.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

DIHEDRAL—See Gottshall, Louis.

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

GOTTSHALL, Louis, 643 Broadway, New York, N. Y. "Dihedral."

INGRAM-RICHARDSON Mfg. Co., Beaver Falls, Pa.

LIMERICK Co., J. Arthur, 960 N. Howard St., Baltimore, Md. (See page 349.)

MURDOCK, Jr. Co., Jas., 116 Opera Pl., Cincinnati, O.

NIAGARA Falls Metal Stamping Works, 23b Tenth St., Niagara Falls, N. Y.

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

ROYAL Enameling & Mfg. Co., 336 W. Madison St., Chicago, Ill.

STAFFORD Co., N., 67 Fulton St., New York, N. Y.

STILLMAN, A. P., 124 Chambers St., New York, N. Y.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

NUTS

CASTELLATED NUTS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

BRIGHTMAN Mfg. Co., Columbus, O.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. (See pages 227 and 343.)

CLARK Bros. Bolt Co., Milldale, Conn. (See page 79.)

COLUMBIA Nut & Bolt Co., 1550 Railroad Ave., Bridgeport, Conn.

DETROIT Screw Works, Detroit, Mich, (See page 341.)

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

GRAHAM Nut Co., Pittsburg, Pa.

MILTON Mfg. Co., Milton, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 269.)

NATIONAL Bolt & Nut Co., Pittsburg, Pa.

RHODE Island Tool Co., Providence, R. I.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

STANDARD Screw Co., 79 Beacon St., Worcester, Mass.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 343.)

FINISHED AND CASE HARDENED NUTS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

Complete Index to Classification appears on Pages 8 to 26.

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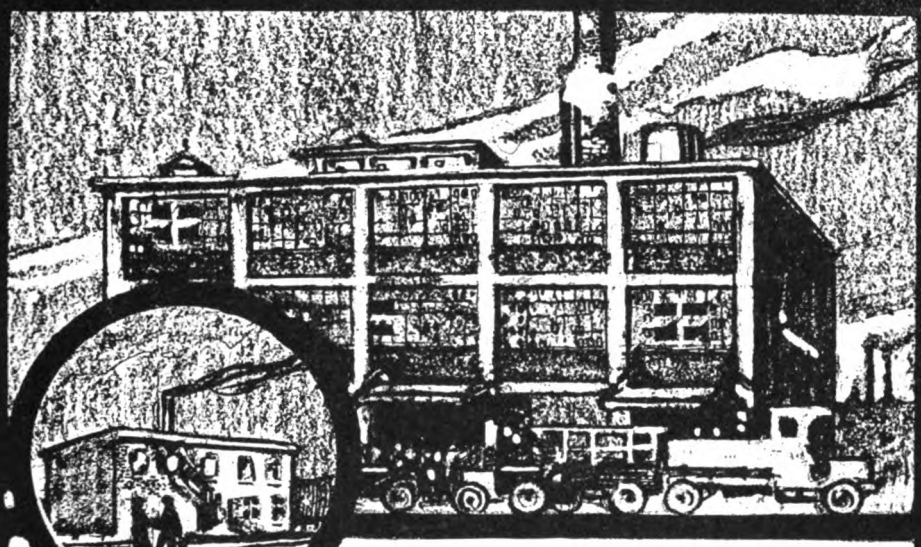

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NUTS (Continued)

FINISHED AND CASE HARDENED NUTS (Continued)

BRIGHTMAN Mfg. Co., Columbus, O.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill.
(See pages 227 and 343.)

CLARK Bros. Bolt Co., Milldale, Conn.
(See page 79.)

DETROIT Screw Works, Detroit, Mich.
(See page 341.)

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

GRAHAM NUT CO., Pittsburg, Pa.

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn.
(See page 297.)

HASKELL Mfg. Co., Wm. H., 24 Commerce St., Pawtucket, R. I.

MILTON Mfg. Co., Milton, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O.
(See page 269.)

NATIONAL Bolt & Nut Co., Pittsburg, Pa.

NEW HAVEN Machine Screw Co., New Haven, Conn.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Lafayette St., Detroit, Mich.

PITTSBURG Screw & Bolt Co., Preble Ave. (N. S.), Pittsburg, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RHODE Island Tool Co., Providence, R. I.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O.
(See page 343.)

LOCK NUTS AND WASHERS

AMERICAN Lock-Nut Co. (Pullman Station), Chicago, Ill.

AMERICAN Nut & Bolt Fastener Co., Pittsburg, Pa. "Bartley."

BARTLEY—See American Nut & Bolt Fastener Co.

CINCINNATI Screw & Tap Co., 2442 Beekman St., Cincinnati, O.

COLUMBIA Nut & Bolt Co., 1550 Railroad Ave., Bridgeport, Conn. "Gib."

EMPIRE Automatic Equipment Co., Syracuse, N. Y. "Tite-Wad."

GIB—See Columbia Nut & Bolt Co.

GRIP Nut Co., McCormick Bldg., Chicago, Ill.

H. P. L. Washer & Safety Bolt Mfg. Co., 121 Charlotte St., Lancaster, Pa.
(See page 269.)

HOBBS Mfg. Co., Worcester, Mass.

HUGTITE—See United Nut Lock Co.

MITCHELL Spring Works, W. G., Johnstown, Pa.

NATIONAL Lock Washer Co., Johnson & Herman Sts., Newark, N. J.

POSITIVE Lock Washer Co., Newark, N. J.
(See page 465.)

RELIANCE Mfg. Co., Massillon, O.
(See page 465.)

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

STEEL Specialties Co., 79 Milk St., Boston, Mass. "W. W. W."

TITE-WAD—See Empire Automatic Equipment Co.

TORSION Nut-Lock & Washer Co., 6 Beacon St., Boston, Mass.

UNITED Nut Lock Co., Springfield, Mass. "Hugtite."

U. S. Lock Washer Co., 34-36 Brenner St., Newark, N. J.

UNIVERSAL Lock-Washer Co., 1555-65 Railroad Ave., Bridgeport, Conn.

W. W. W.—See Steel Specialties Co.

THUMB OR WING NUTS

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

BILLINGS & Spencer Co., Hartford, Conn.

CHICAGO Nut Co., 617-31 W. Jackson Blvd., Chicago, Ill.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill.
(See pages 227 and 343.)

CLARK Bros. Bolt Co., Milldale, Conn.
(See page 79.)

COLUMBUS Bolt Works, Columbus, O.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

DETROIT Screw Works, Detroit, Mich.
(See page 341.)

DEVLIN Mfg. Co., Thos., Third & Lehigh Aves., Philadelphia, Pa.

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

HASKELL Mfg. Co., Wm. H., 24 Commerce St., Pawtucket, R. I.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

MILES, Franklin S., 205-07 Quarry St., Philadelphia, Pa.

PENINSULAR Milled Screw Co., Lafayette St., Detroit, Mich.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O.
(See page 343.)

WHITMAN & BARNES Mfg. Co., Akron, O.

OILS

LUBRICATING OILS

A-B-C—See Layton Park Oil & Soap Co.

ACHESON Oildag Co., Port Huron, Mich. "Oildag."

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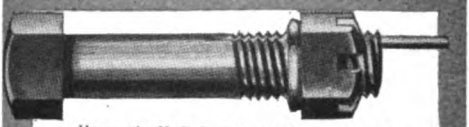

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These bolts are MONEY, TIME and TEMPER saving, they have been invented and designed to overcome the cotter pin trouble in making adjustments, in the H. P. L. Bolt there is a groove in which the tongue of a soft wire washer is recessed, permitting a castellated nut to be screwed up over it after which the tongue of the washer is bent up into one of the castles of the nut, and it will stay locked until you are ready to remove it. The advantages with the wire washers are, it acts as a cushion and prevents the nut from wearing a depression in valuable material, the washer slides the length of the groove, permitting the nut to be locked from the first catch to any point on the body of the bolt.

This is positively the most simple and practical bolt of its kind, they may be had in bulk or in handy packages.

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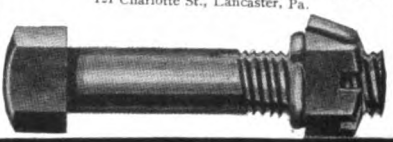

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OILS (Continued)

LUBRICATING OILS (Continued)

ADVANCE Oil Works, 810-12 Flushing Ave., Brooklyn, N. Y.

AJAX Oil & Grease Co., 170 W. 65th St., New York, N. Y.

ALASKA—See Viscosity Oil Co.

ALBANY Lubricating Co., 70°-710 Washington St., New York, N. Y.

ALEXANDER & Co., H. T., 17 Battery Pl., New York, N. Y. "Grand Prix."

AMALIE—See Sonneborn Sons.

AMERICAN Oil Co., Jackson, Mich. "Amoco."

AMOCO—See American Oil Co.

APEX—See Viscosity Oil Co.

ARCO—See Atlantic Refining Co.

ATLANTIC Refining Co., Euclid Ave. & E. 65th St., Cleveland, O. "Arco."

ATLAS—See Swan & Finch Co.

AURORA—See Pigot-Sayre Co.

AUTLUBO—See Moore Oil Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich. "Diamond Cross."

AUTO-USE-IT—See Sawyer Oil Co.

AUTOLEUM—See Chesterton Co.

AUTOLINE—See Robinson & Son Co.

BAKER, Wm. T., 220-32 Suydam Ave., Jersey City, N. J. "Paramount."

BALKAN—See Jones & Bro., J.

BALSO Oil Co., Ohio Bldg., Toledo, O.

BANNER—See Clarkson & Ford Co.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BELDEN & Co., A. G., 145 Maiden Lane, New York, N. Y. "Valvone," "Pycnoleum."

BELL Oil Co., 53 E. Ferry St., St. Louis, Mo. "Liberty Bell."

BLIVEN & Carrington, 125 Broad St., New York, N. Y. "Champion."

BLUE RIBBON—See Sawyer Oil Co.

BORNE, Scrymser Co., 80 South St., New York, N. Y. "Colonial."
(See page 271.)

BUCK & Co., E. A., Worcester, Mass.

BULLY—See Weinberg & Co.

CALYPSOL—See Cataract Refining & Mfg. Co.

CASPIAN—See Viscosity Oil Co.

CATARACT Refining & Mfg. Co., Marine National Bank Bldg., Buffalo, N. Y. "Calypsol."

CENTURY—See Davey & Co.

CHAMPION—See Bliven & Carrington.

CHARTER OAK—See Hall-Thompson Co.

CHESTERTON Co., A. W., 64 India St., Boston, Mass. "Autoleum."

CINCINNATI Oil Works Co., Cincinnati, O.
(See page 417.)

CLARKSON & Ford Co., 55 Water St., New York, N. Y. "Banner."

COLGAN Mfg. & Supply Co., 42 South St., New York, N. Y.

COLONIAL—See Borne, Scrymser Co.

COMMODORE—See Miller Co.

CONNECTICUT Oil Co., 549 S. Leonard St., Waterbury, Conn.

CORTLAND Specialty Co., 174-78 Railroad St., Cortland, N. Y. "Houts Warren."

CRANE & Co., L. M., 91 Oliver St., Boston, Mass. "Eureka."

CRAWFORD Co., Wm. J., 14 Wood St., Pittsburg, Pa.

CREW Levick Co., Land Title Bldg., Philadelphia, Pa. "Perfection."

CROWN—See Great Western Oil Co.

CRYSTALENE—See Viscosity Oil Co.

CYLOIL—See Ilsley, Doubleday & Co.

DAVEY & Co., 2600 Grand Ave., Chicago, Ill. "Century."

DEARBORN Chemical Co., McCormick Bldg., Chicago, Ill.

DEFIANCE—See Waverly Oil Works Co.

DIAMOND CROSS—See Auto Oil Co.

DRAKE Oil Co., 99 E. Spring St., Titusville, Pa. "Speed-Oil."

DUPLEX—See Enterprise Oil Co.

EAGLE Oil & Supply Co., Boston, Mass. "No-Karbon," "Eagleine."
(See page 273.)

EAGLEINE—See Eagle Oil & Supply Co.

EARLENE—See Franklin Oil Works.

EASTERN Supply Co., Hammond & Canterbury Sts., Worcester, Mass.

EMCO—See Emery Mfg. Co.

EMERY Mfg. Co., Bradford, Pa. "Emco."

ENERGINE Refining & Mfg. Co., The Arcade, Cleveland, O.

ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

ENTERPRISE Oil Co., 164 Chandler St., Buffalo, N. Y. "Duplex."

EUCLID—See Reliance Oil & Grease Co.

EUREKA—See Crane & Co.

EXCELSIOR—See Miller's Sons.

EXCELSIOR—See Mills Oil Co.

EXPERT—See Warren Refining Co.

F. V.—See Wadhams Oil Co.

FAULTLESS—See Hawkeye Oil Co.

FIDELITY Oil Co., 306-10 E. 17th St., Kansas City, Mo.

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Lubroleine."

FRANK Oil Co., 23 W. Spring St., Titusville, Pa.

FRANKLIN—See Viscosity Oil Co.

FRANKLIN Oil Works, E. Atlantic Ave., Franklin, Pa. "Earlene."

FRAZER Lubricator Co., 3921 Normal Ave., Chicago, Ill.

FRENCH—See Marshall Oil Co.

FULCRUM Oil Co., Franklin, Pa.

GENERAL Oil Works Co., Traction Bldg., Indianapolis, Ind. "Reliable."

GRAND PRIX—See Alexander & Co.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O. "Nokarbo," "Crown."

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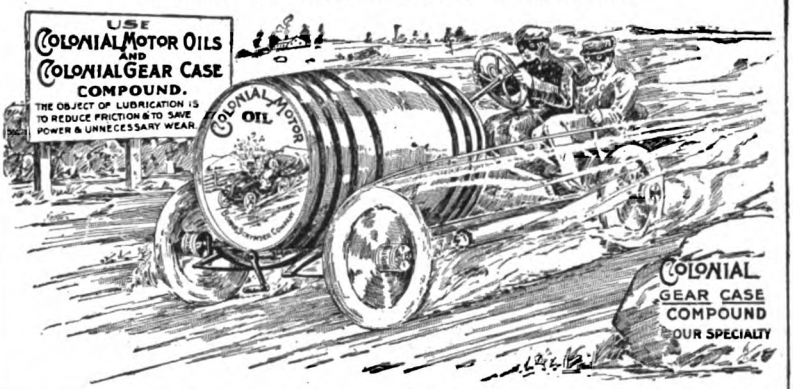

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OILS (Continued)

LUBRICATING OILS (Continued)

GREENSLADE Oil Co., 40 Jefferson Ave., Detroit, Mich. "Packard 24-30."

GULF Refining Co., Frick Bldg. Annex, Pittsburg, Pa.

HAGGERTY Refining Co., 50 South St., New York, N. Y. "Thermo."

HALL-THOMPSON Co., Hartford, Conn. "Charter Oak."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I.

HARRIS & Co., Elmer E., 2 Maurice St., Buffalo, N. Y.

HAVOLINE—See Indian Refining Co.

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HAWS, George A., 142-44 Front St., New York, N. Y. "Panhard."
(See page 273.)

HIGH Grade Oil Refining Co., 68 Broad St., New York, N. Y. "Hygrade," "Motorene," "Packard," "Lozier."

HINDS & Coon, 124-26 Pearl St., Boston, Mass. "Peach."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whizoil."

HOUTS WARREN—See Cortland Specialty Co.

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

HYGRADE—See High Grade Oil Refining Co.

IDEAL—See Sheppard, W. S.

ILSLEY, Doubleday & Co., 229-31 Front St., New York, N. Y. "Cyloil."

INDIAN Refining Co., 17 Battery Pl., New York, N. Y. "Havoline."

INTERSTATE Chemical Co., 12-20 Bayview Ave., Jersey City, N. J.

INTER-TUBE Chemical Co., Schofield Bldg., Cleveland, O.

INVADER Oil Co., 80 Broad St., New York, N. Y.

INVINCIBLE—See Millers Sons Co.

JONES & Bro., J., 429 Locust St., Philadelphia, Pa. "Balkan."

KELLOGG & Co., E. H., 233-43 South St., New York, N. Y.

KENDALL Refining Co., Bradford, Pa.

KEYSTONE Lubricating Co., 1331 Race St., Philadelphia, Pa.

KOSMOS—See Mulliken Oil Co.

LAYTON Park Oil & Soap Co., Milwaukee, Wis. "A-B-C."

LIBERTY—See Richardson Lubricating Co.

LIBERTY BELL—See Bell Oil Co.

LOOS & Dilworth, 134 S. Front St., Philadelphia, Pa. "Paragon."

LOZIER—See High Grade Oil Refining Co.

LUBRO Oil Co., 116 Prospect Ave., N. W., Cleveland, O.

LUBROLEINE—See Fiske Bros. Refining Co.

McLEAN-JONES Oil & Supply Co., 40 India Wharf, Boston, Mass. "Swastika."

MAGIC—See Reliance Oil & Grease Co.

MAGIC—See Viscosity Oil Co.

MAGIE Bros., 110-12 S. Clinton St., Chicago, Ill. "Rock."

MARSHALL Oil Co., Marshalltown, Ia. "French."

METEOR—See Narragansett Chemical Co.

MILLER Co., Wm. P., 244-50 Green St., Brooklyn, N. Y. "Commodore."

MILLER'S Sons, Wm. P., 298-302 Hancock St., Long Island City, N. Y. "Excelsior," "Pan-O-Lite."

MILLERS Sons Co., A. D., Columbus & Preble Aves., Pittsburg, Pa. "Invincible."

MILLS Oil Co., 263 Walton St., Syracuse, N. Y. "Excelsior."

MOBILOIL—See Vacuum Oil Co.

MONAMOBILE—See Monarch Mfg. Co.

MONARCH Mfg. Co., Council Bluffs, Ia. "Monamobile."

MONOGRAM—See New York Lubricating Oil Co.

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O. "Autlubo."

MOTORENE—See High Grade Oil Refining Co.

MOTORLIGHT—See Petroleum Coke Co.

MOTORLUBE—See Tygert Co.

MOTOROL—See New York & New Jersey Lubricant Co.

MULLIKEN Oil Co., 200 Friend St., Boston, Mass. "Kosmos."

MURPHYS—See Phoenix Oil Co.

NARRAGANSETT Chemical Co., 155-61 Orange St., Providence, R. I. "Meteor."

NATIONAL Oil & Supply Co., 180 Frelinghuysen Ave., Newark, N. J. "Viscos."

NATIONAL Refining Co., Rose Bldg., Cleveland, O.

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram."
(See page 275.)

NEW York & New Jersey Lubricant Co., 165 Broadway, New York, N. Y. "Motorol."

NOBLE Refining Co., 706 Canal Rd., Cleveland, O.

NO-KARBON—See Eagle Oil & Supply Co.

NOKARBO—See Great Western Oil Co.

NYE, Wm. F., New Bedford, Mass.

OIL City Oil & Grease Co., 365-77 Seneca St., Oil City, Pa. "Pensoil."

OIL Products Co., 17 Battery Pl., New York, N. Y. "Usoline."

OILDAG—See Acheson Oildag Co.

OILZUM—See White & Bagley Co.

OTTOMO—See Pioneer Mfg. Co.

OZARK—See Tropical Oil Co.

PACKARD—See High Grade Oil Refining Co.

PACKARD—See Wolverine Lubricants Co. of New York.

PACKARD 24-30—See Greenslade Oil Co.

PANAMA Oil & Grease Co., 159-61 W. 51st St., New York, N. Y.

PANHARD—See Haws, Geo. A.

PAN-O-LITE—See Miller's Sons.

PARAGON—See Loos & Dilworth.

PARAGON Refining Co., Front St., Toledo, O. "Petrolene."

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OILS (Continued)

LUBRICATING OILS (Continued)

PARAMOUNT—See Baker, Wm. T.

PARAMOUNT—See Viscosity Oil Co.

PATHFINDER—See Sweet, Charles F.

PATTERSON Lubricating Co., 114 Broad St., Boston, Mass.

PENN Oil Co., W. 12th St., Erie, Pa.

PENN Oil & Supply Co., Chicago, Ill.

PENN Petroleum Co., 115-17 N. Second St., Philadelphia, Pa. "Primus."

PENSOIL—See Oil City Oil & Grease Co.

PERFECTION—See Crew Levick Co.

PERFECTION—See Wood Co.

PERRY Oil Co., 372 Central Ave., Pawtucket, R. I.

PETROLENE—See Paragon Refining Co.

PETROLEUM Coke Co., Edgemont & Venango Sts., Philadelphia, Pa. "Motorlight."

PETROLEUM Products Co., 3600-10 Grant Blvd., Pittsburg, Pa. "Sound Proof."

PHOENIX Oil Co., 2554 W. Fifth St., Cleveland, O. "Murphys."

PIGOT-SAYRE Co., 71-73 Front St., New York, N. Y. "Aurora."

PIONEER Mfg. Co., 5220 Sweeney Ave., S. E., Cleveland, O. "Ottomo."

PIONEER Oil Co., Old South Bldg., Boston, Mass.

PLATT & Washburn Refining Co., 15 Broadway, New York, N. Y. "Veedol." (See page 275.)

POLARINE—See Standard Oil Co. of N. Y.

PRIMUS—See Penn Petroleum Co.

PURE Oil Co., First St., & 13th Ave., S., Minneapolis, Minn. "Puritan."

PURE Oil Co., Fifth & Chestnut Sts., Philadelphia, Pa.

PURITAN—See Pure Oil Co.

PURITAN Oil Co., 1218 W. 70th St., Cleveland, O.

PYCNOLEUM—See Belden & Co.

RELIABLE—See General Oil Works Co.

RELIANCE Oil & Grease Co., 1521 Columbus Rd., Cleveland, O. "Euclid," "Magic."

RICHARDSON Lubricating Co., Quincy, Ill. "Liberty."

ROBINSON & Son Co., Wm. C., 32 South St., Baltimore, Md. "Autoline," Robsoco."

ROBSOCO—See Robinson & Son Co.

ROCK—See Magie Bros.

SAWYER Oil Co., Howard B., 65 Long Wharf, Boston, Mass. "Blue Ribbon," "Auto-Use-It."

SHEPPARD, W. S., 21 Lawrence St., Newark, N. J. "Ideal."

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SOUND PROOF—See Petroleum Products Co.

SPEARE'S Sons Co., Alden, 140 Sixth St., Boston, Mass.

SPEED-OIL—See Drake Oil Co.

STANDARD Oil Co. of N. Y., New York, N. Y. "Polarine."

STAR Oil Co., 440-42 N. Halsted St., Chicago, Ill.

SULLIVAN Oil Co., 418 Wells St., Chicago, Ill.

SUPERIOR—See Viscosity Oil Co.

SUPERIOR Oil Co., Century Bldg., Cleveland, O.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

SWAN & Co., Alden S., 135 Front St., New York, N. Y. "Swanoleine."

SWAN & Finch Co., 151 Maiden Lane, New York, N. Y. "Atlas."

SWANOLEINE—See Swan & Co.

SWASTIKA—See McLean-Jones Oil & Supply Co.

SWEET, Charles F., 247 State St., Hartford, Conn. "Pathfinder."

TEXACO—See Texas Co.

TEXAS Co., 17 Battery Pl., New York, N. Y. "Texaco."

THERMO—See Haggerty Refining Co.

TIONA Refining Co., Madison Ave. & Belt Ry., Indianapolis, Ind.

TROPICAL Oil Co., W., 70th St. & L. S. & M. S. Ry., Cleveland, O. "Ozark."

TYGERT Co., E. A., 126 N. Front St., Philadelphia, Pa. "Motorlube."

UNDERHAY Oil Co., 276 Franklin St., Boston, Mass.

UNION Petroleum Co., 135 S. Second St., Philadelphia, Pa.

USOLINE—See Oil Products Co.

VACUUM Oil Co., Rochester, N. Y. "Mobiloil."

VALVOLINE Oil Co., 11 Broadway, New York, N. Y.

VALVONE—See Belden & Co.

VEEDOL—See Platt & Washburn Refining Co.

VELVET—See Sutherland & Co.

VISCO Motor Oil Co., 2104 Superior Viaduct, Cleveland, O.

VISCOS—See National Oil & Supply Co.

VISCOSITY Oil Co., 1101-03 W. 37th St., Chicago, Ill. "Caspian," "Crystalene," "Franklin," "Visoco," "Zero," "Alaska," "Paramount," "Apex," "Superior," "Magic."

VISOCO—See Viscosity Oil Co.

WADHAMS Oil Co., Milwaukee, Wis. "F. V."

WARREN Refining Co., 1137 W. 11th St., Cleveland, O. "Expert."

WAVERLY Oil Works Co., 54th St. & A. V. R. R., Pittsburg, Pa. "Defiance."

WEINBERG & Co., J. H., 128 Maiden Lane, New York, N. Y. "Bully."

WHALE—See Nye, Wm. F.

WHITE & Bagley Co., Worcester, Mass. "Oilzum." (See Back Cover.)

WHIZOIL—See Hollingshead Co.

WILBURINE Oil Works, 11 Broadway, New York, N. Y.

WINN, Wm. R., 143 Maiden Lane, New York, N. Y.

WOLFS HEAD—See Wolverine Lubricants Co. of N. Y.

WOLVERINE Lubricants Co. of N. Y., 80 Broad St., New York, N. Y. "Packard," "Wolfs Head."

WOOD Co., W. A., 373 Atlantic Ave., Boston, Mass. "Perfection."

YOUKIM—See Young & Kimball.

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OILS (Continued)

LUBRICATING OILS (Continued)

YOUNG, Orlando W., 277 Halsey St., Newark, N. J.

YOUNG & Kimball, Frank L., 111 Purchase St., Boston, Mass. "Youkim."

ZERO—See Viscosity Oil Co.

ZURN Co., O. F., 2736-38 N. Broad St., Philadelphia, Pa. "Zurnoil."

ZURNOIL—See Zurn Co.

ORNAMENTS

RADIATOR ORNAMENTS

ÆTNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

CRAMP & Sons Ship & Engine Building Co., William. Philadelphia, Pa. (See page 257.)

GOODWIN & Kintz Co., Winsted, Conn.

INTERNATIONAL Silver Co., Meriden, Conn.

ROBBINS & Myers Co., Springfield, O.

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

PACKING

ASBESTOS AND FIBROUS PACKING

AMBESCO—See American Asbestos Co.

AMERICAN Asbestos Co., Norristown, Pa. "Ambesco." (See page 355.)

ASBESTOS & Rubber Works of America, 1790 Broadway, New York, N. Y. "Motobestos." (See page 57.)

ASBESTOS & Rubber Works of New Jersey, Camden, N. J. (See page Opposite Inside Back Cover.)

BROWN & Co., Charles D., 140 Washington St., Boston, Mass. (N. Boston). "Vellumoid."

CAREY Co., Philip (Lockland), Cincinnati, O.

CRANDALL Packing Co., Palmyra, N. Y.

DEFENDER—See Woven Steel Hose & Rubber Co.

DEMON—See Hart Packing Co.

EAGLE Oil & Supply Co., Boston, Mass. (See page 273.)

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J. "Motobestos."

ENDURA Mfg. Co., 6306 Eastwich Ave., Philadelphia, Pa.

ESSEX Rubber Co., Trenton, N. J.

GARLOCK Packing Co., Palmyra, N. Y.

GENERAL Asbestos & Rubber Co., Charleston, S. C. (See page 55.)

HART Packing Co., 144 High St., Boston, Mass. "Demon."

HODGART & Co., 122 S. Michigan Ave., Chicago, Ill.

J. M. MOBILENE—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J. M. Mobilene."

KEASBEY & Mattison Co., Ambler, Pa.

KNOWLTON Rubber Co., Geo. W., 60 Pearl St., Boston, Mass.

MOTOBESTOS—See Asbestos & Rubber Works of America.

MOTOBESTOS—See Empire Rubber & Tire Co.

NATIONAL Asbestos Co., Lena & Armat Sts., (Germantown), Philadelphia, Pa.

STANDARD Brake Lining Co., Gleasondale, Mass.

STAYBESTOS Mfg. Co., (Germantown), Philadelphia, Pa. (See page 57.)

VELLUMOID—See Brown & Co.

WOVEN Steel Hose & Rubber Co., Trenton, N. J. "Defender." (See page 531.)

METALLIC PACKING

(See Gaskets, Metallic)

RUBBER PACKING

BOSTON Belting Co., 84 Linden Park St., Boston, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CINCINNATI Rubber Mfg. Co., Cincinnati, O. (See page 139.)

CRANDALL Packing Co., Palmyra, N. Y.

EAGLE Oil & Supply Co., Boston, Mass. (See page 273.)

GARLOCK Packing Co., Palmyra, N. Y.

HAMILTON Rubber Mfg. Co., Trenton, N. J. (See page 425.)

HART Packing Co., 144 High St., Boston, Mass.

HOME Tire Co., Trenton, N. J.

KNOWLTON Rubber Co., Geo. W., 60 Pearl St., Boston, Mass.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REPUBLIC Rubber Co., Youngstown, O.

THERMOID Rubber Co., Trenton, N. J. "Vulcanoid." (See page 55.)

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. (See page 355.)

VULCANOID—See Thermoid Rubber Co.

Complete Index to Classification appears on Pages 8 to 26.

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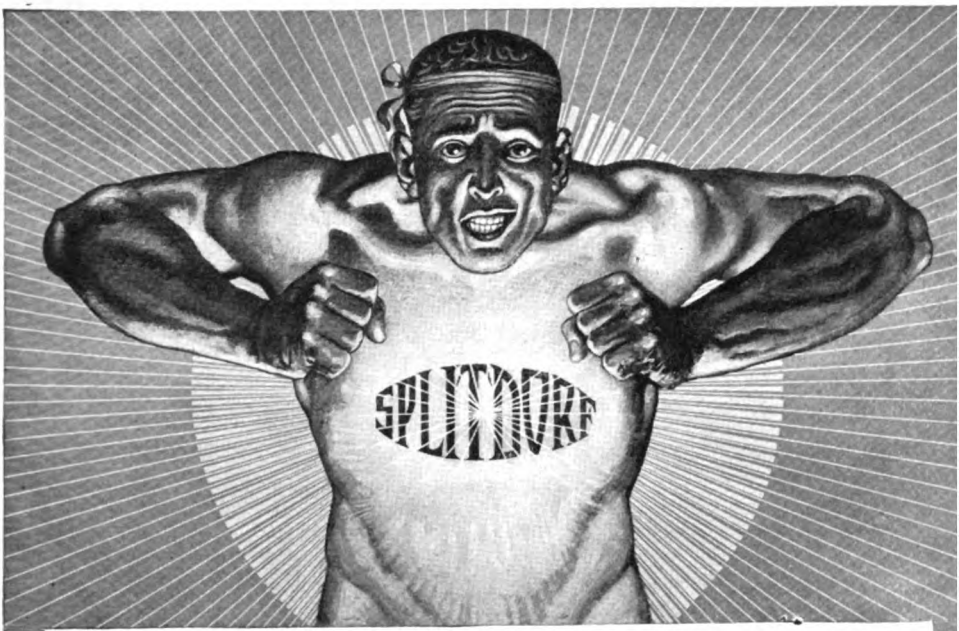

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DAYTON.....427 E. 3d St.
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KANSAS CITY.....1827 Grand Ave.
LOS ANGELES.....1215 S. Hope St.
MINNEAPOLIS.....34 S. 8th St.
NEWARK.....290 Halsey St.
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PAINTS

PAINTS AND COLORS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

ARSENAL Varnish Co., Rock Island, Ill.

AULT & Wiborg Co., New, Seventh & Culvert Sts., Cincinnati, O.

BAY STATE—See Wadsworth, Howland & Co.

BESCO—See Buffalo Enamel & Stain Co.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

BROWN & Co., Joseph M., 31 W. Kinzie St., Chicago, Ill.

BUCKEYE Paint & Varnish Co., 15th & Lucas Sts., Toledo, O.

BUFFALO Enamel & Stain Co., White Bldg., Buffalo, N. Y. "Besco."

BULLS-EYE—See Zinsser & Co.

CAPITOL CITY—See Indianapolis Paint & Color Co.

CHICAGO White Lead & Oil Co., 1454 S. Western Ave., Chicago, Ill. "King."

CINCINNATI Color Co., Eighth & Evans Sts., Cincinnati, O.

CINCINNATI Varnish Co., 211 South St., Cincinnati, O.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

DITZLER Color Co., 18 W. Baltimore Ave., Detroit, Mich.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FLINT Varnish Works, Flint, Mich.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GRAVES Co., N. Z., 22-26 S. Third St., Philadelphia, Pa.

HANLINE Bros., Baltimore, Md.
(See page 279.)

HEATH & Milligan Mfg. Co., 1825-71 Seward St., Chicago, Ill.

HIGH STANDARD—See Lowe Bros. Co.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

HOFFMAN Paint & Varnish Co., 8 Medford St., Boston, Mass.

INDIANAPOLIS Paint & Color Co., 118 W. Chesapeake St., Indianapolis, Ind. "Capitol City."

JOHNSTON Paint Co., R. F., Cincinnati, O.
(See page 165.)

KEYSTONE Paint & Filler Co., Munsey, Pa.

KING—See Chicago White Lead & Oil Co.

LOWE Bros. Co., Dayton, O. "High Standard."

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

MASURY & Son, John W., New York, N. Y.

MOORAMEL—See Moore & Co.

MOORE & Co., Benjamin, 231-33 Front St., Brooklyn, N. Y. "Mooramel."

MOSER Co., Chas., Cincinnati, O.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

NELSON Color Co., Amesbury, Mass.

NICE, Eugene E., 272-74 S. Second St., Philadelphia, Pa.

PATTERSON-SARGENT Co., E. 38th & St. Clair Sts., Cleveland, O.

PIERCE Co., F. O., 12 W. Broadway, New York, N. Y.

RICKER-BENNETT Co., 37 Harris St. (N. Cambridge), Cambridge, Mass.

ST. LOUIS Surfacer & Paint Co., Arlington Ave. & Terminal Belt Line, St. Louis, Mo.

SHRACK & Co., C., 152 N. Fourth St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

SMITH & Co., Edward, Sixth St. & West Ave., Long Island City, N. Y.

VALENTINE & Co., 456 Fourth Ave., New York, N. Y.

WADSWORTH, Howland & Co., 84 Washington St, Boston, Mass. "Bay State."

WILHELM Co., A., Third & Bern Sts., Reading, Pa.

WILLEY Co., C. A. (Hunter's Point), New York, N. Y.
(See page 279.)

ZINSSER & Co., W., 195 William St., New York, N. Y. "Bulls-Eye."

ALUMINUM AND BRONZE PAINTS

ALUSTRIUM—See Devoe & C. T. Raynolds Co.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Silkup."
(See page 129.)

BAER Bros., 25-27 W. Houston St., New York, N. Y.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco"

BINSWANGER & Co., B., 329-35 N. Third St., Philadelphia, Pa.

BRONZE Powder Works Co., Elizabeth, N. J. "Ideal," "Vulcan."

CULLEN & Co., F. C., First National Bank Bldg., Chicago, Ill.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y. "Alustrium."

GENTER Co., J. H., Newburgh, N. Y. "Mirroroide."
(See page 281.)

GERSTENDORFER Bros., 231 E. 42d St., New York, N. Y. "Sapolin."

IDEAL—See Bronze Powder Works Co.

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PAINTS (Continued)

ALUMINUM AND BRONZE PAINTS (Continued)

KEMP Co., W. H., 165 Spring St., New York, N. Y.

MIRROROIDE—See Genter Co.

NUBIAN Paint & Varnish Co., 1856 Le Claire Ave., Chicago, Ill. "Victory."

SAPOLIN—See Gerstendorfer Bros.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y.

SLIKUP—See Arnold, N. B.

UHLFELDER Co., Leo, 130-32 W. 29th St., New York, N. Y.

VICTORY—See Nubian Paint & Varnish Co.

VULCAN—See Bronze Powder Works Co.

ENAMEL PAINTS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill.

AKRON Varnish Co., Akron, O. "Imperial."

AULT & Wiborg Co., New, Seventh & Culvert Sts., Cincinnati, O.

ARMITAGE & Co., John L., Newark, N. J.

BAY STATE—See Wadsworth, Howland & Co.

BERRY Bros., Detroit, Mich.

BESCO—See Buffalo Enamel & Stain Co.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

BOYER Chemical Laboratory Co., 8 E. Michigan St., Chicago, Ill.

BUFFALO Enamel & Stain Co., White Bldg., Buffalo, N. Y. "Besco."

CHASE, Roberts & Co., Fifth St. & West Ave., Long Island City, N. Y.

CLEVELAND Varnish Co., 3111 E. 87th St., Cleveland, O.

COLUMBUS Varnish Co., Columbus, O. "Peerless."
(See page 281.)

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

ESSEX Varnish Co., 92 Vesey St., Newark, N. J.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FLINT Varnish Works, Flint, Mich.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

HANLINE Bros., Baltimore, Md.
(See page 279.)

HARDY Paint & Varnish Co., Toledo, O.

IMPERIAL—See Akron Varnish Co.

MASURY & Son, John W., New York, N. Y.

MOLLER & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill.
(See page 131.)

PEERLESS—See Columbus Varnish Co.

PRATT & Lambert, Buffalo, N. Y.

ROYAL—See Wilhelm Co.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

SOUTH-WEST Paint & Varnish Co., 2006-12 N. Lamar St., Dallas, Tex.

STANDARD Varnish Works (Elm Park), Port Richmond, N. Y.

VALENTINE & Co., 456 Fourth Ave., New York, N. Y.

WADSWORTH, Howland & Co., 84 Washington St., Boston, Mass. "Bay State."

WILHELM Co., Third & Bern Sts., Reading, Pa. "Royal."

EXHAUST PIPE AND MUFFLER PAINTS

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 129.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Sta-On."
(See page 131.)

BULGER Varnish Co., William, 3053 E. 87th St., Cleveland, O.

C. O. T.—See Tingley & Co.

CENTURY—See Arnstein, Eugene.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

GENTER Co., J. H., Newburgh, N. Y. "Mirroroide."
(See page 281.)

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

MIRROROIDE—See Genter Co.

NORTHWESTERN Chemical Co., Marietta, O.
(See page 129.)

RIE-NIE—See Durkee-Atwood Co.

SLIKUP—See Arnold, N. B.

STA-ON—See Atlas Auto Supply Co.

TINGLEY & Co., Chas. O., Rahway, N. J. "C. O. T."

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Wang."

WANG—See Van Tilburg Oil Co.

WONDER WORKER—See Hall-Thompson Co.

WILHELM Co., A., Third & Bern Sts., Reading, Pa. "Royal."

RIM PAINTS

(See also Paints, Aluminum and Bronze; also Paints, Enamel)

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 129.)

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill.
(See page 131.)

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Peerless Lining Dye.
Peerless Cushion Dressing.
Peerless Lamp Enamel, Gloss and Dull Finish.
Peerless Jet Black Fender Japan.
Peerless Cylinder Enamel, Black and Gray Finish.
Peerless Mirroroid.
Peerless Auto Body Polish.
Peerless Extra Fine Black Japan.
Peerless Extra Fine Black Baking Japan.

For descriptions see classified columns in Automobile publications.

Sold by Dealers and Jobbers Everywhere

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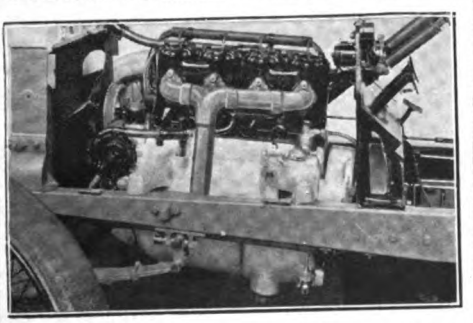
Sole Mfgrs. Columbus, Ohio



Special Heat Resisting
MIRROROIDE
METALIZED
GLASS BRONZE

Keeps every part of your engine in tip-top shape. Makes it glisten like NEW. Gives a smooth high gloss and an absolute Rust Proof protection to engines, radiators, fans, etc.
Mirroroide Keeps its lustre. Never burns off. Can't melt, even at 2200°.
In gold, silver, aluminum and copper and By Colors.
Trial One-half Pint Can, $1.00.
Try a Can. Prepaid upon receipt of price.

J. H. GENTER COMPANY, Inc.
NEWBURGH, NEW YORK

We have a very interesting Proposition for Dealers and Manufacturers.

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PAINTS (Continued)

RIM PAINTS (Continued)

BEARDSLEE, J. W., Elmira, N. Y.

C. O. T.—See Tingley & Co.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

GENTER Co., J. H., Newburgh, N. Y. "Mirroroide."
(See page 281.)

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

MIRROROIDE—See Genter Co.

NORTHWESTERN Chemical Co. Marietta, O.
(See page 129.)

RIE-NIE—See Durkee-Atwood Co.

SLIKUP—See Arnold, N. B.

TINGLEY & Co., Chas. O., Rahway, N. J. "C. O. T."

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

RUBBER PAINTS

(For refinishing rubber mats and matting and painting tires.)

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 129.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Preservo."
(See page 131.)

AUTO Products Co. of America, 116 N. Commercial St., St. Louis, Mo. "Punchs."

BRADLEY & Vrooman Co., Chicago, Ill. "Velvet."

BULL DOG—See Polson Bros. Mfg. Co.

CENTURY—See Arnstein, Eugene.

CHIEFTAIN Mfg. Co., Charleston, W. Va. "Tire-Life."

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

FAULTLESS—See Hawkeye Oil Co.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

JEWEL—See Wadsworth-Howland Co.

NARCO TIRENEW—See National Rubber Co.

NATIONAL Cement & Rubber Co., 300-16 S. St. Clair St., Toledo, O.

NATIONAL Rubber Co., 4409 Papin St., St. Louis, Mo. "Narco Tirenew."
(See page 131.)

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill.
(See page 131.)

NORTHWESTERN Chemical Co., Marietta, O. "Tire-Lac."
(See page 129.)

POLSON Bros. Mfg. Co., 331 Southwest Blvd., Kansas City, Mo. "Bull Dog."

PRESERVO—See Atlas Auto Supply Co.

PUNCHS—See Auto Products Co. of America.

RIE-NIE—See Durkee-Atwood Co.

RUTHERFORD Rubber Co., Rutherford, N. J.

SAVAGE Tire Co., Main & Sicard Sts., San Diego, Cal.

SECURITY Reliner Co., 38 Meade St., Montgomery, N. Y.

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

SIN-TI Rubber Co., Home Life Bldg., Washington, D. C.

SLIKUP—See Arnold, N. B.

STURDY Mfg. Co., 2637 Michigan Ave., Chicago, Ill. "Tyre-Tonic."

TINGLEY & Co., Chas. O., Rahway, N. J. "Tire Solder."

TIRE-LAC—See Northwestern Chemical Co.

TIRE-LIFE—See Chieftain Mfg. Co.

TIRE SOLDER—See Tingley & Co.

TYRE TONIC—See Sturdy Mfg. Co.

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Wang."

VELVET—See Bradley & Vrooman Co.

WADSFORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WANG—See Van Tilburg Oil Co.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

PANELS

CHARGING PANELS AND SWITCHBOARDS

ANDRAE & Sons Co., Julius, 358-64 Broadway, Milwaukee, Wis.

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis.
(See page 185.)

CUTTER Co., Geo., South Bend, Ind.

ELECTRIC Products Co., Cleveland, O.

ELECTRIC Storage Battery & Mfg. Co., Cincinnati, O.

GENERAL Electric Co., Schenectady, N. Y.

H. K.—See Krantz Mfg. Co.

KRANTZ Mfg. Co., H., 160-66 Seventh St., Brooklyn, N. Y. "H. K."

LANG Electric Co., J., 423 N. Lincoln St., Chicago, Ill.

LEONARD Electric Co., Ward, Bronxville, N. Y.

METROPOLITAN Electric Mfg. Co., East Ave. & 14th St., Long Island City, N. Y.

WESTERN Electric Co., 463 West St., New York, N. Y.

Complete Index to Classification appears on Pages 8 to 26.

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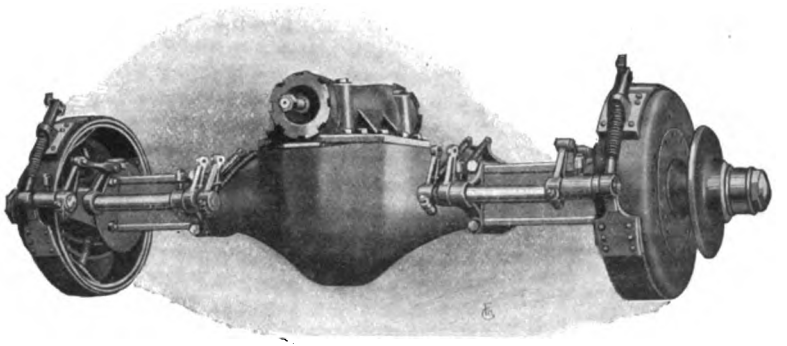
The Public Demands Them

SHELDON WORM DRIVE AXLES



ARE YOU prepared to meet the demand for WORM-DRIVEN TRUCKS? DO YOU realize the advance this type of axle is making? The single reduction, the great simplicity, and its adaptability to the needs of the user make it supreme.

SILENT and neat because all parts are enclosed in a sturdy cast steel housing. No chains and radius rods to rattle. All parts working in oil, insuring perfect quietness in operation.

SIMPLE because it is non-adjustable and positively fool-proof.

EFFICIENT because it's a direct drive, with a single reduction. Eliminates the loss of power in driving through a jack-shaft and chains. Conserves power because it has a sliding contact over a large surface, several teeth taking the strain instead of one tooth as in the bevel gears of the jack-shaft.

GET ready for this demand for the Worm Drive. Do it by getting a SHELDON EQUIPMENT—FRONT AXLES, REAR AXLES, and SPRINGS made of CARBON or ELECTRO-SILICA-MANGANESE STEEL.

SHELDON AXLE COMPANY
WILKES-BARRE, PA.

Chicago Branch
68 E. 12th Street

Detroit Branch
1215 Woodward Avenue

San Francisco Branch
444 Market Street

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PANELS (Continued)

WOOD PANELS

AMERICAN Veneer Co., 1501 Clinton St., Hoboken, N. J.
(See page 151.)

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

EMPIRE Panel & Veneer Co., 940 Seneca St., Buffalo, N. Y.

MICHIGAN Veneer Co., Alpena, Mich.

NEW Jersey Veneer Co., 258 W. Railway Ave., Paterson, N. J.

WISCONSIN Seating Co., New London, Wis.

PANS

DRIP PANS

A-Z Co., 530 W. 56th St., New York, N. Y.

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

CULLEN-ATKINSON Co., 120 Allyn St., Hartford, Conn. "Hartford."

DOVER Stamping & Mfg. Co., Cambridge, Mass.
(See page 97.)

DURLACH, I., 199-201 Wooster St., New York, N. Y.

HARTFORD—See Cullen-Atkinson Co.

HAYES Mfg. Co., Detroit, Mich.

IDEAL Sheet Metal Works, 2809 Michigan Ave., Chicago, Ill.
(See page 327.)

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 399.)

LAWSON Co., F. H., Cincinnati, O.

REID Co., 1603 Second Ave., Moline, Ill.

ROCHESTER Can Co., 103-09 Hague St., Rochester, N. Y.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SEXTON Can Co., 228 Franklin St., Boston, Mass.

SMYTH Garage Pan Mfg. Co., Patchogue, N. Y.

TODD Mfg. Co., 820-24 Mary Pl., Minneapolis, Minn.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

DUST PANS OR UNDER BONNETS

A-Z Co., 530 W. 56th St., New York, N. Y.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BUNN-HUTCHINSON Co., 2074 E. 22d St., Cleveland, O.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

IDEAL Sheet Metal Works, 2809 Michigan Ave., Chicago, Ill.
(See page 327.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KINSEY Mfg. Co., Toledo, O.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE Pressed Steel Co., East Moline, Ill.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

WELDED Steel Barrel Corp., Leib & Wight Sts., Detroit, Mich.

XARDELL Bros Co., 28 Broadway, Utica, N. Y.

PAPER

FRICTION PAPER

(See Frictions, Fibre)

PASTE

HAND PASTE

(See Soaps, Hand)

SOLDERING PASTE

(See Flux, Soldering)

TRIMMERS PASTE

BUCKEYE Paste Co., Columbus, O.

PATCHES

TIRE REPAIR PATCHES

(See also Shoes, Inner Tire; also Sleeves, Tire Repair)

ALDING—See Alsten & Goulding Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O. "Cling-Tite."

BATAVIA Rubber Co., Batavia, N. Y.

BRICTSON Mfg. Co., Brookings, S. Dak.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

BULL DOG—See Polson Bros. Mfg. Co.

CENTURY—See Nemo Chemical & Specialty Mfg. Co.

CHEMI Co., 629 E. Main St., Richmond, Va. "Se-Ment-All."

CLING-TITE—See American Tire & Rubber Co.

CONTINENTAL Rubber Works, Erie, Pa.

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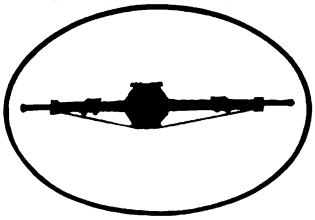
American Axles

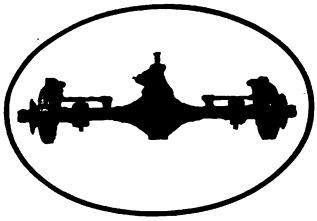
are the

PIONEERS

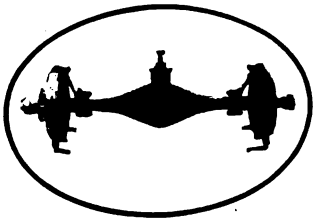
FIRST in the Field. We made the First axles for the First motor cars. Many years of making anti-friction axles for carriages and wagons had qualified us to lead the way.



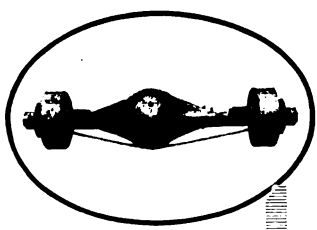
FIRST in Chain Drive. This *American* Axle was the *last word* when we first brought it out years ago. Compare it with our latest types!



FIRST in Bevel Drive. We were the ORIGINATORS of successful bevel-drive axles, a type since used by practically every motor car manufacturer in the *world.*



FIRST in Worm Drive. We pioneered this type in America, and its present-day popularity is the direct result of our painstaking design and accurate manufacture.



FIRST in Spiral Bevel. We were the First axle builders to produce Spiral-Bevel axles for the trade. Before offering them, we spent many months of time and many thousands of dollars in perfecting a structure that would properly support this special form of bevel gear.

Always First in design; First in constantly anticipating the axle needs of motor cars; and First in the high development of craftsmanship and machinery. *American* Axles today are

Farther in the Lead Than Ever Before!

THE AMERICAN BALL-BEARING CO.

CLEVELAND, OHIO

Pioneer Axle Builders of America

Licensed Under The Kardo Company Patents

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PATCHES (Continued)

TIRE REPAIR PATCHES (Continued)

DIAMOND Rubber Co., Akron, O.

DOUBLE Fabric Tire Co., 60 W. Ninth St., Auburn, Ind.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ENDURANCE Tire & Rubber Co., New Brunswick, N. J.

EVERLASTING—See Legnard & Co.

EXCEL Rubber Co., Akron, O.

FALLS Rubber Co., Cuyahoga Falls, O.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

FIRESTONE Tire & Rubber Co., Akron, O

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Selbst-Gemacht."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

JIFFY Specialty Co., McKeesport, Pa.

K-C—See Western Tire & Rubber Co.

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa.

LEE Tire & Rubber Co., Conshohocken, Pa.

LEGNARD & Co., A. B., Waukegan, Ill. "Everlasting."

M. & M. Mfg. Co., Akron, O. "Stick-Tite."

MATTSON Rubber Co., Lodi, N. J.
(See page 471.)

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

NATIONAL Cement & Rubber Co., 300-16 S. St. Clair St., Toledo, O.

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill. "Century."
(See page 131.)

PARKER, Stearns & Co., 286 Sheffield Ave., Brooklyn, N. Y.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

POLSON Bros. Mfg. Co., 331 Southwest Blvd., Kansas City, Mo. "Bull Dog."

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

QUICK-TITE Patch Co., 20 Market St., Amsterdam, N. Y.

RUBBER Goods Supply & Mfg. Co., Akron, O.

S. H. Mfg. Co., 1761 Broadway, New York, N. Y.

SAVAGE Tire Co., Main & Sicord Sts., San Diego, Cal.

SE-MENT-ALL—See Chemi Co.

SEAMLESS Rubber Co., New Haven, Conn.

SECURITY Co., 30 Shingiss St., Pittsburg, Pa.

SELBST-GEMACHT—See Gray Specialty Co.

STANDARD Rubber & Cable Co., Bridgeport, Conn.

STICK-TITE—See M. & M. Mfg. Co.

TINGLEY & Co., Chas. O., Rahway, N. J.

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.
(See page 355.)

WESTERN Tire & Rubber Co., 1701-03 Grand Ave., Kansas City, Mo., "K.-C."

WONDER WORKER—See Hall-Thompson Co.

YATMAN Rubber Co., 267-69 Mt. Pleasant Ave., Newark, N. J.

PATTERNS

AUTOMOBILE PATTERN MAKERS

ACME Pattern Co., Grant & Letchworth Sts., Buffalo, N. Y.

ACME Pattern Works, 9 Woodward Ave., Detroit, Mich.

BUFFALO Pattern Works, 13-17 Perry St., Buffalo, N. Y.

EASTERN Pattern Works, 28-32 Wight St., Detroit, Mich.

HARTFORD Pattern & Model Co., 120 Allyn St., Hartford, Conn.

JACOBSEN & Co., K. F., Racine, Wis.

JURACK Pattern Works, Chas., 199-201 Oregon St., Milwaukee, Wis.

LUZIER & Son, T. B., 1641-45 N. Tenth St., Philadelphia, Pa.

MICHIGAN Pattern Works, 1085-89 Jefferson Ave., E., Detroit, Mich.

NESOM & Wenz Co., 22 W. South St., Indianapolis, Ind.

NOBACH Pattern Works, W. J., 522-24 Jackson Blvd., Chicago, Ill.

PEERLESS Pattern Works, 405 E. Madison St., South Bend, Ind.

PHILLIPS, W. H., Cambridge, Mass.

REMMERS Pattern Co., 2121 N. Ninth St., St. Louis, Mo.

STANDARD Pattern Works, 144-46 Fort St. E., Detroit, Mich.

STANDARD Pattern Works Co., 5337 St. Clair Ave., Cleveland, O.

WALKER Bros. Co., 216 Walton St., Syracuse, N. Y.

WALLACE, John D., 527 W. Van Buren St., Chicago, Ill.

WEST & Dodge, 384 Atlantic Ave., Boston, Mass.

WHITELEY Bros., 82-84 Church St., New York, N. Y.
(See page 529.)

PEDALS

HORN AND CUT OUT PEDALS

BARCO Brass & Joint Co., 212-22 W. Illinois St., Chicago, Ill.

CLEVELAND Hardware Co., Cleveland, O.

Complete Index to Classification appears on Pages 8 to 26.

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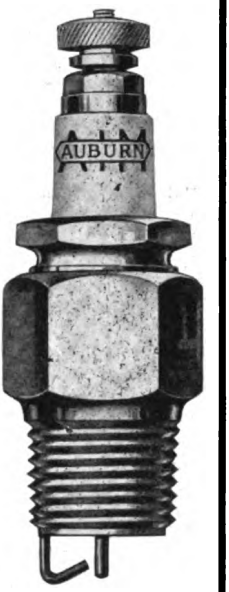
The AUBURN IGNITION MFG. CO.

AUBURN, N. Y.

No. 8 LONG PORCELAIN

No. 8 PORCELAIN



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AUBURN Spark Plugs

No. 7 CARBON PROOF

The Only Positive Self Cleaning Spark Plug

Cannot Carbonize the Heat from the Wire Coil. Consumes the Oil and Smoke.

Cannot Leak. Compression Built All in One Piece Without Bushing.

No. 3 MICA MOTORCYCLE

No. 4 MICA TRUCKS and MARINE

PRICE $1.50

AUBURN Spark Plugs

are built of the best material money can buy. Designed by experts and constructed for use with high or low tension systems. Perfectly insulated. Will not leak compression or short-circuit.

WE BUILD BOTH MICA and PORCELAIN

WESTERN SALES DEPARTMENT

THE ZINKE CO., 1326 Michigan Ave., CHICAGO, ILL.

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PEDALS (Continued)

HORN AND CUT OUT PEDALS (Continued)

COX Brass Mfg. Co., Albany, N. Y. **(See page 511.)**

DAYTON Malleable Iron Co., Dayton, O.

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

ELECTRIC Horn & Specialty Co., 119 Columbia St., Utica, N. Y. "Oneita."

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." **(See page 87.)**

GEMCO—See Garage Equipment Mfg. Co.

GRAY-HAWLEY Mfg. Co., 937-48 Jefferson Ave., Detroit, Mich.

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

MEDINA Stamping & Machine Co., Medina, N. Y.

ONEITA—See Electric Horn & Specialty Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C., B. & Q. R. R., Chicago, Ill. **(See page 327.)**

WHITEHOUSE LeCompte Mfg. Co., 42-54 Elm St, Newark, N. J. **(See page 509.)**

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

RATCHET PEDALS

(For locking Brakes, etc.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. **(See page 87.)**

SPECIAL ACCELERATOR PEDALS

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." **(See page 87.)**

GEMCO—See Garage Equipment Mfg. Co.

HACKNEY—See Roller-Bearing Foot Pedal Co.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. "Imperial-Wixon." **(See page 329.)**

IMPERIAL-WIXON — See Imperial Brass Mfg. Co.

ROLLER-BEARING Foot Pedal Co., Hackney Bldg., St. Paul, Minn. "Hackney."

PINIONS

METAL AND RAWHIDE PINIONS

(See Gears)

PINS

COTTER PINS

AKRON Machine Co., Akron, O.

AMERICAN Chain Co., Bridgeport, Conn. "Campbell."

BROOKS & Sons, M. S., Chester, Conn.

CAMPBELL—See American Chain Co.

COBB & Drew, Plymouth, Mass.

HINDLEY Mfg. Co., John St., Valley Falls, R. I.

HUBBARD Spring Co., M. D., Pontiac, Mich. **(See page 395.)**

JENCKES Mfg. Co., E., 28 Union St., Worcester, Mass.

McWHORTER Mfg. Co., Riverton, N. J.

NATIONAL Screw & Tack Co., Stanton Ave., & C. & P. Ry., Cleveland, O.

PICKERING Co., R. S., Sharon Hill, Pa.

SACO—See Smith & Co.

SMITH & Co., F. P., 114 Railroad Ave., Sharon Hill, Pa. "Saco."

WHITMAN & Barnes Mfg. Co., Akron, O.

WIRE Goods Co., 28 Union St., Worcester, Mass.

ESCUTCHEON PINS

ATLAS Tack Co., Fairhaven, Mass.

BLAKE & Johnson Co., Waterbury, Conn.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y.

MILWAUKEE Tack Co., 27th Ave. & Wahl St., Milwaukee, Wis.

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

STAR—See Turner & Seymour Mfg. Co.

TURNER & Seymour Mfg. Co., Torrington, Conn. "Star."

WATERBURY Mfg. Co., Waterbury, Conn.

WIRE Goods Co., 28 Union St., Worcester, Mass.

PISTON PINS

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y. **(See page 247.)**

SPACKE Machine Co., F. W., Indianapolis, Ind. **(See page 289.)**

WAINWRIGHT & Son, W. W., Connersville, Ind. **(See page 291.)**

TAPER PINS

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. **(See pages 227 and 343.)**

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SUPERIOR AUTOMOBILE PARTS

ACCURATELY MADE

PROMPT DELIVERIES

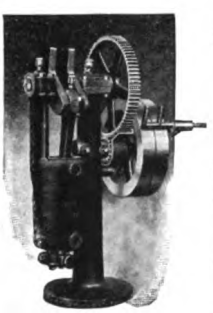
PISTONS
PISTON RINGS
PISTON PINS
HARDENED AND GROUND PIECES
TIMING GEARS
TRANSMISSION GEARS
CYLINDERS

CONSISTENT PRICES

SPECIALIZED PRODUCTION

SPACKE Automobile Machine Parts, made to specifications, are the result of years of effort devoted to this work, and to the furnishing in quantity of better and cheaper parts.

By their use you will obtain a better product, save money, and be rid of troublesome manufacturing details.



If in the market for quantity lots, it will pay you to send us your inquiries and blue prints for estimate.

AIR COMPRESSORS

A full line of Air Compressors and accessories for automobile garage use. Single and three-cylinder styles—belt and motor drive.

No modern garage is complete without this equipment. *Send for catalog and prices.*

THE F.W. SPACKE MACHINE CO

INDIANAPOLIS, IND., U.S.A.

NO-31-A

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PINS (Continued)

TAPER PINS (Continued)

CORBIN Screw Corp., 219 High St., New Britain, Conn.

DETROIT Screw Works, Detroit, Mich.
(See page 341.)

FERRY Cap & Set Screw Co., 2151 Scranton Rd., Cleveland, O.

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn.
(See page 297.)

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Sewing Machine Co., Belvidere, Ill.

PRATT & Whitney Co., Hartford, Conn.
(See page 457.)

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

STANDARD Screw Co., 79 Beacon St., Worcester, Mass.

STANDARD Tool Co., 6900-34 Central Ave., Cleveland, O.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O.
(See page 343.)

PIPE

WROUGHT IRON AND STEEL PIPE

BYERS Co., A. M., 235 Water St., Pittsburg, Pa.

CRANE Co., 836 S. Michigan Ave, Chicago, Ill.

LA BELLE Iron Works, Steubenville, O.

MARK Mfg. Co., Chicago, Ill.

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa.

READING Iron Co., Reading, Pa.

SPANG, Chalfant & Co., Union Bank Bldg., Pittsburg, Pa.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

PIPING

EXHAUST AND INTAKE PIPING

(See Manifolds, Exhaust)

PISTONS

FINISHED AND MACHINED PISTONS

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.

HARRISBURG Pipe & Pipe Bending Co., Harrisburg, Pa.

HULL Mfg. Co., Lansing, Mich.

MICHIGAN Crank Shaft Co., Lansing, Mich.
(See page 149.)

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 289.)

WAINWRIGHT & Son, W. W., Connersville, Ind.
(See page 291.)

PLATES

NAME PLATES

AMERICAN Name Plate & Engraving Co., 352 Atlantic Ave., Boston, Mass.

BERNARD Co., J., 422-30 E. 53d St., New York, N. Y.

BLACKINTON & Co., V. H., Attleboro Falls, Mass.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CHANDLER Co., Napier St., Springfield, Mass.

CHILDS & Co., S. D., 376 W. Monroe St., Chicago, Ill.

COLGAN Co., J. W., Sudbury Bldg., Boston, Mass.

CROWE Name Plate & Engraving Co., Chicago, Ill.
(See page 291.)

ELECTRO-CHEMICAL Engraving Co., 90 West St., New York, N. Y.

ETCHING Company of America, 2526-28 W. Congress St., Chicago, Ill.

GRAMMES & Sons, L. F., Jordan & Union Sts., Allentown, Pa.

GREENDUCK Co., 2127 Tilden Ave., Chicago, Ill.

HAEUSERMANN Metal Mfg. Co., 1098-1102 Brook Ave., New York, N. Y.

HANSON, C. H., 178 N. Clark St., Chicago, Ill.

HENDERSON-AMES Co., Main, Park & Water Sts., Kalamazoo, Mich.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

MAYER Co., Geo. J., 36 S. Meridian St., Indianapolis, Ind.

MULHAUPT, F., Jos., 301-05 N. Fifth St., Lafayette, Ind.

MURDOCK, Jr. Co., Jas., 116 Opera Pl., Cincinnati, O.

NEW York Stencil Works, 100 Nassau St., New York, N. Y.

O'CONNOR, James, Nevada Bldg., Cincinnati, O.

PREMIER Metal Etching Co., 617-21 E. 18th St., New York, N. Y.

QUINT'S Sons Co., S. H., 15 S. Fourth St., Philadelphia, Pa.

ROBBINS Mfg. Co., John, 58 Kneeland St., Boston, Mass.

SHEPARD Mfg. Co., 364 Franklin St., Melrose Highlands, Mass.

SMITH & Co., Jos. N Detroit, Mich.
(See page 203.)

STAFFORD Co., N., 57 Fulton St., New York, N. Y.

TURNER Brass Works, Sycamore, Ill.

WALTER & Sons, N. C., 3 Park Row, New York, N. Y.

WATSON Co., Mechanics St., Attleboro, Mass.

Complete Index to Classification appears on Pages 8 to 26.

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Federal Pressed Steel Company
Milwaukee, Wis.

Seamless steel products:

GASOLINE TANKS
STARTER TANKS
BRAKE DRUMS

NAME PLATES FOR AUTOMOBILES

ACCESSORIES, MACHINERY, ETC.

ETCHED SILL AND DASH PLATES

SKELETON RADIATOR

LIGHT METAL STAMPING AND FORMING

LET US FIGURE ON YOUR REQUIREMENTS

WE SUBMIT DESIGNS & SAMPLES

CAREFUL EXECUTION
PROMPT DELIVERIES

Crewe Name Plate and Engraving Co. Chicago

The Only Exclusive Makers Of Worm Drive Axles

EMPIRE AXLE COMPANY
DUNKIRK, N. Y.

SPECIALISTS

We can supply our standard type pistons or make them to your B/Ps.

Our standard type piston rings have secured hundreds of satisified customers for us.

Piston pins uniformly case hardened and ground to exact diameters.

We are in shape to figure on your cylinders of any type in quantity lots.

W. W. Wainwright & Son
Connersville, Ind.

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PLATES (Continued)

NAME PLATES (Continued)

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

WRIGHT & Son, Greg. G., 119-21 Opera Pl., Cincinnati, O.

YEUELL Co., E. V., Middlesex Ct., Malden, Mass.

PLATING

BRASS AND NICKEL PLATING

AJAX Plating & Specialty Mfg. Co., 371 Seventh St., Buffalo, N. Y.

AMERICAN Car & Ship Hardware Mfg. Co., Dept. T, New Castle, Pa. (See page 249.)

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind.

BERNARD Co., J., 422-30 E. 53d St., New York, N. Y.

BOESCH Lamp Co., 1135 Mission St., San Francisco, Cal.

BOSTON Nickel Plating Co., 160 Portland St., Boston, Mass.

BRIDGEPORT Electro Plate Co., 270 Kossuth St., Bridgeport, Conn.

BRIDGEPORT Metal Goods Mfg. Co., Howard Ave. & Spruce St., Bridgeport, Conn.

BRISKIN Mfg. Co., 539 N. Capitol Ave., Indianapolis, Ind.

CHENEY & Son, S., Manlius, N. Y.

CREUTZ Plating Co., Fifth & Elm Sts., Cincinnati, O.

DETLAFF, A. J., 121 Champlain St., Detroit, Mich.

ERIE Stamping & Mfg. Co., 644-48 W. 12th St., Erie, Pa.

EXETER Brass Works, Exeter, N. H.

FRIES & Co., Buffalo, N. Y.

HILLMAN Auto Supply Mfg. Co., 98 Massachusetts Ave., Boston, Mass.

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

METROPOLITAN Mfg. Co., 12th St., & G. T. R. R., Detroit, Mich.

NEHLS Plating Works, 248 Brush St., Detroit, Mich.

U. S. Electro-Galvanizing Co., 1-9 Park Ave., Brooklyn, N. Y.

VOELKNER & Harry Mfg. Co., 282-92 Woodbridge St., E., Detroit, Mich.

WHITEHOUSE LeCompte Mfg. Co., 42-54 Elm St., Newark, N. J. (See page 509.)

PLATINUM

(See also Points, Sparking)

AMERICAN Platinum Works, 225-31 N. J. R. R. Ave., Newark, N. J.

BAKER & Co., Newark, N. J. (See page 461.)

BISHOP & Co., Platinum Works, J., Malvern, Pa.

COMMERCIAL Research Co., Tuckahoe, N. Y. (See page 461.)

DEE & Co., Thos. J. D., Mallers Bldg., Chicago, Ill.

GOLDSMITH Bros. Smelting & Refining Co., Heyworth Bldg., Chicago, Ill.

PLATT, C. S., 29 Gold St., New York, N. Y.

ROESSLER & Hasslacher Chemical Co., 100 William St., New York, N. Y. (See page 461.)

PLIERS

TIRE REPAIR PLIERS

ERICKSON & Son, P. E., Port Chester, N. Y.

M-E Co., Great Northern Bldg., Chicago, Ill.

NATIONAL Cutlery Co., Westmoreland & Boudinot Sts., Philadelphia, Pa.

PLUGS

CHARGING PLUGS AND RECEPTACLES

ANDERSON Mfg. Co., Albert & J. M., 289 A St., Boston, Mass.

GENERAL Electric Co., Schenectady, N. Y.

LANG Electric Co., J., 423 N. Lincoln St., Chicago, Ill.

RUSSELL & Stoll Co., 48 Cliff St., New York, N. Y.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

SPARK PLUGS

A. C.—See Champion Ignition Co.

A-Q—See All-And-Co.

ACME Sales Co., 237 Jefferson Ave., Detroit, Mich. "Lore."

AJAX—See Star Specialty Mfg. Co.

ALBRIGHT Ignition Co., Columbus, Ga.

ALDING—See Alsten & Goulding Co.

ALL-AND-CO., Springfield, Mass. "A-Q."

ALL-IN-ONE—See Frontier Specialty Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMERICAN Coil Co., Foxboro, Mass.

ANCHOR—See Szel Import & Export Co.

ANDERSON Spark Plug Co., 206 N. Holliday St., Baltimore, Md. (See page 301.)

ARROW—See Reflex Ignition Co.

AUBURN—See New York Mica & Mfg. Co.

AUBURN Ignition Mfg. Co., Auburn, N. Y. (See page 287.)

AURORA Vulcan Co., Security Bldg., Bridgeport, Conn.

AUTO-MARINE—See Legnard & Co.

AXWELL Equipment Co., 421 Wood St., Pittsburg, Pa.

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CHAMPION SPARK PLUGS

½ in. Champion "X" (Ford) 75c.

½ in. Champion "S" (Studebaker $1.00

CHAMPION SPARK PLUGS

When ordering spark plugs it is well to remember that your customer should have the plug that has proven best for his particular use.

Do you realize that nearly every one of your customers receives his car with CHAMPION SPARK PLUGS in the cylinders and should always replace with them to get the best running condition?

Over 75% of all the cars made this year are leaving the factory equipped with CHAMPION PLUGS.

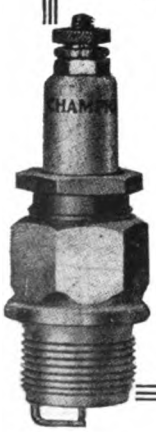
CHAMPION SPARK PLUGS go to your customer insured. If there is any defect whatsoever, we want to know it and we are always willing to make good our guarantee which covers everything. We put the worth of our product right up to the user.

OUR GUARANTEE

All CHAMPION PLUGS are guaranteed to give absolute satisfaction or full repairs or replacement will be made.

On this page you see illustrated the standard CHAMPION PLUGS. CHAMPION X for Fords (the same as furnished to the Ford Company), CHAMPION O for Overlands (the same as furnished to the Overland Company), CHAMPION S for Studebaker (the same as furnished to the Studebaker Company), and the regular CHAMPION ⅞"-18 for Maxwell (the same as furnished the Maxwell Company).

"Toledo Made for the Whole World's Trade"



⅞—18 Champion Regular (Maxwell) $1.00

½" Champion "O" (Overland) $1.00

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CHAMPION SPARK PLUGS

Extra Long ½ in. Champion Regular (Metz) $1.00

We show a few of the special CHAMPION PLUGS. The extra long ½" for the Metz, the long ⅞"-18 Conical, the CHAMPION INDESTRUCTIBLE HEAVY STONE PLUG and the CHAMPION HEAVY MOTORCYCLE PLUG, the latest addition to our line.

Our especially built plugs are made to work in perfect unison with some particular motor condition. These plugs have passed the most severe factory test and are exclusively specified and used by the largest car manufacturers in the world, Ford, Studebaker, Maxwell, Overland, Metz and over fifty other well-known makers of motor cars.

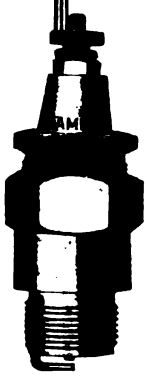
On the fourth page of this insert you will find a list of all the American and foreign cars, showing the CHAMPION PLUG, which you are absolutely safe in recommending for each particular motor.

The Champion Priming Plug is a ready seller during the winter. Will start any motor on the first quarter turn. Every Ford owner is a possible purchaser. The only priming plug nationally advertised in such publications as the Saturday Evening Post, Literary Digest, and others.

With more than three-fourths of the cars made Champion equipped at their factory, with Champion the only plug so widely nationally advertised, with Champion Plugs absolutely guaranteed to you and your customer, is there any question in your mind what make plug you can do the most business in and make the most profit from? You are absolutely safe in stocking a full line of CHAMPION PLUGS.

You can exchange at full cost allowance any one type Champion for any other in accordance with the demand in your particular territory.

Champion Porcelains combine to the highest degree the two all important qualities Electrical Strength (Puncture proof), Mechanical Strength (toughness).

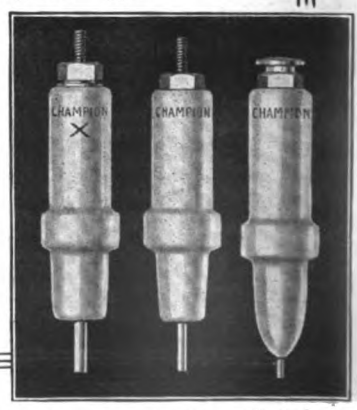


⅞—18 Champion Heavy Stone $1.25

½ in. ⅞—18 Metric Champion Motorcycle $1.00

Long ⅞—18 Champion Regular (Buick) $1.00

Champion Priming Plug, ½-in., ⅞-18. Metric, $1.25.



X 35c | Regular 40c | Conical 40c

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CHAMPION SPARK PLUGS

Metric Motorcycle Mica

⅞-18 S. A. E. Champion Mica

CHAMPION MICA PLUGS represent the highest pinacle of Mica Plug building. The core is of the very finest quality of pure India Mica doubly insulated and laterally wound center tube and washers assembled under heavy pressure. The general construction of the compression chamber electrodes, insulation, etc., is that of the regular CHAMPION, proved in service. The MICA PLUG is guaranteed against short circuit or other defect for one year. CHAMPION MICA PLUGS may be had in all types and threads.

1915 PRICES TO THE TRADE.		EACH IN LOTS OF Less than 50	50 or More	100 or More	List
FORD					
Champion "X" Plugs	½ in.	$0.37	$0.35	$0.33	$0.75
STUDEBAKER					
Studebaker "S" Plugs	½ in.	.42	.40	.38	1.00
MAXWELL					
Champion Regular	⅞ 18	.42	.40	.38	1.00
OVERLAND					
Champion "O"	½ in.	.42	.40	.38	1.00
METZ					
Champion Extra Long Plugs	½ in.				
Champion Priming Plugs	½ in.	.65	.62	.60	1.25
Champion Priming Plugs	⅞ 18				
Champion Motorcycle Priming Plugs, all threads					
Champion Regular Plugs	½ in.	.42	.40	.38	1.00
Champion Regular Plugs	⅞ in.				
Champion Regular Long Plugs	½-⅞ in.				
Champion "X" Plugs	⅞ in.	.37	.35	.33	.75
Champion Heavy Stone Plugs		.60	.57	.55	1.25
Champion Truck Plugs	½ in.	.47	.45	.43	.40
Champion Truck Plugs	⅞ in.				
Champion Conical Plugs	½ in.	.42	.40	.38	1.00
Champion Conical Plugs	⅞ in.				
Champion Mica Plugs	½ in.				
Champion Mica Plugs	⅞ in.				
Champion Motorcycle Plugs (Mica).					
Champion Motorcycle Plugs (Porcelain).					

Spark Plug Parts, Wrenches, Terminals, Etc.

Champion Heavy Stone Cores	@ $.33 each	.60 each
Champion Truck Cores	@ .28 each	.50 each
Champion Priming Plug Cores	@ .24 each	.40 each
Champion Cores, Regular and Conical	@ .24 each	.40 each
Champion Mica Cores	@ .24 each	.40 each
Champion Motorcycle Cores	@ .24 each	.40 each
Champion "X" Cores	@ .20 each	.35 each
C. S. P. Priming Plug Wrench	@ 2.00 doz.	.25 each
Misskip Detector	@ 2.00 doz.	.25 each
Box of Champion "Becco" Terminals	@ 5.00 each	13.75 each
Copper Asbestos Gaskets for Porcelains	@ 1.50 perC	.03 each
⅞ 18 and Metric Gaskets	@ .50 perC	.03 each

NOTE—Assorted orders will be billed at full quantity prices, giving dealers same advantage as if orders were for one type. Terms 2% 10 days, 30 days net.

Champion Becco Terminals, simplest, yet most efficient. No soldering. Perfect Contact. No Tools.

C. S. P. PRIMING PLUG WRENCH

Complete Spark Plug Wrench for all styles and sizes of Spark Plugs.

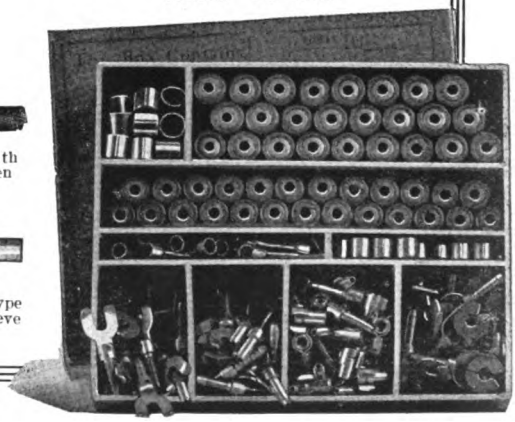
25c

Complete satisfaction to the user is our guarantee

Fits any spark plug or priming plug made

Post Type With Cable Cut Open

Spring Clip Type With Fibre Sleeve



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CHAMPION SPARK PLUGS

PLEASURE CARS

Abbott-Detroit	Conical	⅞-18
Alco	Conical	⅞-18
Alpena	Regular	⅞-18
Ames	Conical	⅞-18
American	Conical	⅞-18
Apperson	Conical	⅞-18
Arbenz	X	½"
Auburn	Regular	⅞-18
Austin	Conical	⅞-18
Buick	Conical	⅞-18 Long
Cadillac	Conical	⅞-18
Cameron	Regular	½"
Cartercar	Conical	⅞-18
Case	Regular	⅞-18
Chadwick	Regular	Metric
Chalmers	Conical	⅞-18
Chandler	Regular	½"
Chandler		⅞-18
Chevrolet	Conical	⅞-18
Cino	Conical	⅞-18
Cole	Conical	⅞-18
Crawford	Regular	⅞-18
Crow-Elk-Hart	Regular	⅞-18
Cunningham	Conical	⅞-18
Cutting	Regular	½"
Davis	Conical	⅞-18
Detroiter	Regular	½"
Dorris	Regular	⅞-18
Edwards-Knight	Conical	⅞-18
Empire	X	½"
Enger	Conical	⅞-18
Fiat	Conical	⅞-18
Firestone-Columbus	Regular	⅞-18
Ford	X	½"
Franklin	Mica	⅞-18
Garford	Conical	⅞-18
Gaylord	Regular	½" Long
Glide	Regular	⅞-18
Grant	Regular	⅞-18
Grant		⅞-18
Great Southern	Regular	⅞-18
Great Western	X	½"
Havers	Regular	⅞-18
Haynes	Conical	⅞-18
Henderson	Conical	⅞-18 Long
Herreshoff	Regular	⅞-18
Hudson	Conical	⅞-18
Hupmobile	Conical	⅞-18
Imperial	Regular	⅞-18
Inter-State	Conical	⅞-18
Jackson	Regular	⅞-18
Kearns	X	½"
Keeton	Regular	⅞-18
King	Conical	⅞-18
Kissel Kar	Regular	⅞-18
Kline Kar	Conical	⅞-18
Knox	Conical	⅞-18
Krit	X	½"
Lenox	Regular	⅞-18
Lexington	Regular	⅞-18
Lion	Regular	½"
Little	X	⅞-18
Locomobile	Conical	⅞-18
Lozier	Conical	⅞-18
Luverne	Conical	⅞-18
Lyons-Knight	Conical	⅞-18
McFarlan	Regular	⅞-18
McIntyre	Regular	⅞
Marathon	Regular	½"
Marion	Regular	⅞-18
Marmon	Conical	⅞-18
Mason	X	½"
Matheson	Regular	⅞" Long
Maxwell	Regular	½-18 & ⅞
Mercer	Regular	⅞-18
Metz	Regular	½ Ex. Long
Michigan	Regular	⅞-18 Long
Midland	Regular	⅞-18
Mitchell	Regular	½"
Moline	Regular	½"
Moon	Regular	½"
Monarch	Regular	⅞-18
Morse	Regular	Metric
Moyer	Regular	⅞-18
National	Conical	⅞-18
Norwalk	Regular	½"
Nyberg	X	½"
Oakland	Regular	⅞-18
Ohio	X	⅞-18
Oldsmobile	Regular	⅞" Long
Overland	Champion	0
Packard	Regular	Metric
Paige	Regular	⅞-18
Palmer-Singer	Conical	⅞-18 Long
Patterson	Regular	⅞-18
Pathfinder	Regular	⅞-18
Peerless	Regular	Metric
Perfex	Conical	⅞-18
Pierce-Arrow	Regular	Metric
Pilot	Regular	⅞-18
Pope-Hartford	Conical	⅞-18
Pratt-Elkhart	Conical	⅞-18
Premier	Conical	⅞-18
Pullman	Conical	⅞-18
R. C. H.	Regular	⅞-18
Rambler	Regular	⅞-18 & ½
Regal	X	½"
Reo	Regular	½"
Richmond	Conical	⅞-18
Saxon		⅞-18
Schacht	Conical	⅞-18
Selden	Conical	⅞-18
Simplex	Conical	Metric
Speedwell	Conical	⅞-18
Staver	Regular	⅞-18
Stearns-Knight	Metric and	⅞-18
Stevens-Duryea	Conical	⅞-18
Stoddard-Dayton	Regular	⅞-18
Studebaker	Regular	½ & ⅞-18
Stutz	Conical	⅞-18
Tribune	Regular	½"
Velie	Regular	⅞-18
Wahl	X	½"
Warren	Regular	⅞-18
Wescott	Conical	⅞-18
White	Regular	Metric
Winton	Regular	½" Long
Zimmerman	Conical	½"
All Foreign Cars	Regular	Metric

COMMERCIAL CARS

Abendroth	Regular	½"
Adams	Regular	⅞-18
Akron-Ideal	Regular	⅞-18
Alco	Truck	⅞-18
American LaFrance	Truck	⅞-18
Atterbury	X	½"
Armleder	Mica	⅞-18
Auglaize	X	½"
Autocar	Conical	⅞-18
Avery	Regular	½"
Barker	Regular	⅞-18
Beck	Regular	⅞-18
Bessemer	X	½"
Best	Regular	½"
Blair	Regular	⅞-18
Brennan	Regular	Metric
Brockway	Regular	½"
Brown	Conical	⅞-18
Cass	Conical	½"
Chase	Conical	½"
Commer	Conical	½"
Commerce	X	½"
Croce	Regular	½"
Crown	X	½"
Dart	X	½"
Decatur	Regular	⅞-18
Federal	Regular	⅞-18
G. J. G.	Regular	⅞-18
G. M. G.	Conical	⅞-18
Gabriel	Regular	⅞-18
Garford	Truck	⅞-18
Gramm-Bernstein	Conical	½"
Hart-Kraft	Conical	½"
Hatfield	Conical	⅞-18
Hupmobile	Regular	⅞-18
Hydraulic	Conical	⅞-18
I. H. C.	Regular	½"
Ideal	Regular	½"
Indiana	Regular	½"
KaDix	Regular	⅞-18
Kearns	X	½"
Kelly	Conical	⅞-18
Kissel	Conical	⅞-18
Kline	Regular	⅞-18
Knox	Conical	⅞-18
Koehler	Regular	⅞-18
Krebs	Regular	⅞-18
Lambert	Regular	⅞-18
Lange	Regular	⅞-18
Lauth-Juergens	Regular	⅞-18
Lippard-Stewart	Regular	⅞-18
Little Giant	X	½"
Mack, Saurer & Hewitt	Conical	⅞-18
Mais	Conical	⅞-18
Marmon	Conical	⅞-18
Menominee	Regular	⅞-18
Mercury	X	½"
Modern	Regular	½ & ⅞-18
Monitor	X	½"
Mora	Regular	½"
Morton	Conical	Metric
Packard	Regular	Metric
Packers	Regular	½"
Palmer-Moore	X	½"
Peerless	Regular	Metric
Pierce-Arrow	Regular	Metric
Plymouth	Regular	½"
Progress	Regular	⅞-18
Reo	Regular	½"
Republic	X	½"
Rockford	Regular	½"
Rowe	Regular	⅞"
Sampson	Conical	⅞-18
Sanford	X	½"
Sandusky	Regular	½"
Schacht	Regular	⅞-18
Selden	Regular	⅞-18
Service	Conical	⅞-18
Siebert	Regular	½"
Smith-Milwaukee	Regular	⅞-18
Spaulding	Regular	⅞"
Standard	Regular	⅞-18
Sternberg	Mica	⅞-18
Stewart	X	½"
Studebaker	Regular	½ & ⅞-18
Sullivan Car	X	½"
Tiffin	Regular	⅞-18
U. S.	Regular	⅞-18
Universal	Conical	⅞-18
Utility	X	½"
Van	X	½"
Victor	X	½"
Vulcan	Regular	½"
Wagenhals	X	⅞-18
White	Regular	Metric
Wichita	X	⅞-18
Wilcox Trux	Conical	⅞-18
Willys-Utility	Regular	⅞-18

OUR DEALERS' HELPS

This card with six (6) Plugs attached will be sent free to the dealer ordering 100 or more plugs. We have many other dealers' helps which we will be glad to tell you about if you will correspond with us.

CHAMPION SPARK PLUG COMPANY
1010 Avondale Ave.
TOLEDO, OHIO

R. A. Stranahan, Pres.
F. D. Stranahan, Treas.

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The First 6000 Are a Year Old, and All Still in Service—

MASTER SPARK PLUGS

In March, 1913, after months of expensive experiment, the Master Spark Plug was perfected.

6000 were placed in manufacturer's test cars, motor trucks and private automobiles.

This was **free** of charge. And there was only one stipulation.

We were to be notified at once in case of any failure.

Not a single breakage or failure of any kind has as yet been reported.

This remarkable record spells spark plug perfection.

It is the result of a manufacturing policy that places quality above everything else—a policy that does not hesitate at high prices in order to get the best possible materials and best workmanship obtainable.

Proof of this is furnished by the extremely heavy insulating core capable of withstanding strains that break down ordinary insulators and the unusually wide and well-cushioned seat which allows ample room for contraction and expansion. Easily taken apart, cleaned and reassembled. Always absolutely gas tight.

GUARANTEE—After using Master Spark Plugs for 30 days, if you are not entirely satisfied with your purchase, money will be refunded if requested, on return of plugs where purchased.

A better spark plug cannot be produced at any cost.

Price $1.00. Quantity prices on application.

Hartford Machine Screw Co.

482 Capitol Ave., Hartford, Conn.

Detroit Office & Warehouse
878 Woodward Avenue

New York Office & Warehouse
409 Broome Street

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PLUGS (Continued)

SPARK PLUGS (Continued)

BEAT-EM-ALL—See Mosler & Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Victor," "Copperhead," "Diamond."

BELVIDERE Screw & Machine Co., Belvidere, Ill.

BENFORD Mfg. Co., Box H, Mt. Vernon, N. Y. "Monarch," "Home Run."
(See page 303.)

BENTON Co., L. F., Vergennes, Vt.

BETHLEHEM—See Silvex Co.

BI-SPARK Plug Co., Toledo, Ia.

BIGSBY Mfg. Co., 7500 Quincy Ave., Cleveland, O. "Vital."

BINGHAM Mfg. Co., 227 Prospect Ave., N. W., Cleveland, O. "Snappon."

BLICKENSDERFER & Co., G. C., Stamford, Conn. "Bulls Eye."

BLITZ—See Randall-Faichney Co.

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

BOUGIE-MERCEDES—See Herz & Co.

BREECH-BLOCK—See Mosler & Co.

BROCKETT-GORHAM Co., N. State St., Marion, O. "Bro-Gor."

BRO-GOR—See Brockett-Gorham Co.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

BULLS EYE—See Blickensderfer & Co.

BURNHAM Spark Plug Co., East Edgecomb, Me.

BUSCOBA—See Bush-Scott Co.

BUSH-SCOTT Co., Detroit, Mich. "Buscoba."

CHAMPION Ignition Co., Flint, Mich. "A. C.," "Titan," "Cico."

CHAMPION Spark Plug Co., Toledo, O.
(See pages 293, 294, 295 and 296.)

CHARTER & Co., Hoopeston, Ill.

CICO—See Champion Ignition Co.

COMET—See Oakes & Dow Co.

COMMON SENSE—See Splitdorf Electrical Co.

COPPERHEAD—See Beckley-Ralston Co.

CZAR Ignition Co., 539-43 Ellicott St., Buffalo, N. Y.

DAY, Geo. F., 21 Haverhill St., Boston, Mass.

DE LUXE—See Lockwood-Ash Motor Co.

DELTA Mfg. Co., 266 Fabyan Pl., Newark, N. J.

DETROIT—See Simplex Auto Specialty Co.

DIAMOND—See Beckley-Ralston Co.

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

DOXEY, N. D., Elmira, N. Y. "Lightning," "Yexod."

DRAGON—See Silvex Co.

DUPLEX Multi-Spark Plug Co., Devils Lake, N. D. "Maher."

EISEMANN Magneto Co., 32 33d St., Brooklyn, N. Y.
(See page 251.)

ELGIN Spark Plug & Ignition Co., 21 S. Spring St., Elgin, Ill.

EMPIRE—See Grant Mfg. & Machine Co.

EZEKLEEN—See Perpetual Spark Plug Co.

FAUST Co., H. C., 302 N. Broad St., Philadelphia, Pa. "Panther."

FAW, J. H., 41 Warren St., New York, N. Y. "Red Seal."
(See page 281.)

FIREFLY—See Sharp Spark Plug Co.

FLASH LIGHT—See Janney, Steinmetz & Co.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRONTIER Specialty Co., Buffalo, N. Y. "All-in-One," "Opto."
(See page 303.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

GOLIATH—See Sharp Spark Plug Co.

GOTHAM—See Sturdy Mfg. Co.

GRANT Mfg. & Machine Co., Bridgeport, Conn. "Empire."
(See page 517.)

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y. "Red-Head."

H. M. S. BULL DOG—See Hartford Machine Screw Co.

HAGSTROM Bros. Mfg. Co., Lindsborg, Kans.

HAMPSHIRE Mfg. Co., Hatfield, Mass. "Wizard," "Rival."

HARTFORD Machine Screw Co, 482 Capitol Ave., Hartford, Conn. "Master," "H. M. S. Bull Dog."
(See page 297.)

HECO—See Heinze Electric Co.

HEINZE Electric Co., Lowell, Mass. "Heco."
(See page 499.)

HEL-FI—See Motor Accessories Mfg. Co.

HERZ & Co., 245 W. 55th St., New York, N. Y. "Bougie-Mercedes."
(See page 303.)

HOME RUN—See Benford Mfg. Co.

HOT SHOT—See K-W Ignition Co.

IDEAL Switch Co., Plainville, Conn.

J-D—See Jeffery-Dewitt Co.

J-M—See Johns-Manville Co.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Flash Light."
(See page 399.)

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich. "Reliance," "J-D."
(See pages 301 and 315.)

JEWELL—See Pittsfield Spark Coil Co.

JIFFY Specialty Co., McKeesport, Pa.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

JOHNSON Bros., 303 Downing St., Denver, Colo.

K-W Ignition Co., 2833 Chester Ave., Cleveland, O. "Vim," "Hot Shot."

KALBFELL & Co., C. J., 608 S. Dearborn St., Chicago, Ill.

KINGSTON—See Kokomo Electric Co.

KINSEY Mfg. Co., Toledo, O.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind.

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

Complete Index to Classification appears on Pages 8 to 26.

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Mosler SpitFire Plugs

Magneto Types

Made to fit any engine-any thread

ACCEPT NO SUBSTITUTE

Insist Upon The

RED TAG

IT

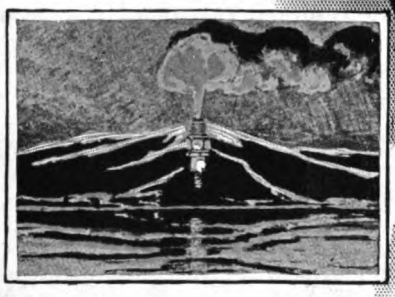
GUARANTEES

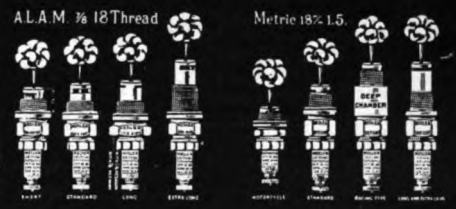
PACKED IN THIS BOX
& TAGGED
FOR YOUR PROTECTION

The New Mosler Vesuvius Plug

Genuine Platinum Point
Guaranteed Forever

Energetic Ignition Greater Power





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LIKED BY EVERYBODY

Absolutely Gas Tight
Has No Equal
For Speed and Power
Can Be Taken Apart Easily
And Reassembled Absolutely Gas Tight
The Stone-Insulated Plug Par Excellence
Will Outlast Your Motor

A.R. MOSLER & Co.,

MT. VERNON, N.Y.

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PLUGS (Continued)

SPARK PLUGS (Continued)

LEADER—See Long Bros.

LEGNARD & Co., A. B., Waukegan, Ill. "Auto-Marine."

LEHMAN Mfg. Co., J. H., 727 Seventh Ave., New York, N. Y.

LIGHTNING—See Doxey, N. D.

LIGHTNING—See Reflex Ignition Co.

LIGHTNING KID—See Reflex Ignition Co.

LOCKWOOD-ASH Motor Co., Horton & Main Sts., Jackson, Mich. "De Luxe," "Never Miss."

LONG Bros., Broadway & Buckeye St., Kokomo, Ind. "Leader," "Ramble."

LONG Distance Spark Plug Co., 212 S. Illinois St., Indianapolis, Ind.

LORE—See Acme Sales Co.

LYNGAAS, Chas. F., 253 Broadway, New York, N. Y. "Lynx."

LYNX—See Lyngaas, Chas. F.

M. C. D.—See McDowell, L. A.

McCORMICK Mfg. Co., First & Sears Sts., Dayton, O.

McDOWELL, L. A., Luverne, Minn. "M. C. D."

MAHER—See Duplex Multi-Spark Plug Co.

MASTER—See Hartford Machine Screw Co.

METEOR—See Star Specialty Mfg. Co.

METZGER, C. A., 13 Canal Pl., New York, N. Y. "Soot Proof."

MIKA—See V-Ray Co.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Victor." (See page 445.)

MONARCH—See Benford Mfg. Co.

MOSLER & Co., A. R., Mt. Vernon, N. Y. "Spit Fire," "Triumph," "Beat-em-all," "Breech-Block," "Vesuvius." (See page 299.)

MOTOR Accessories Mfg. Co., 34 W. Main St., Marshalltown, Ia. "Hel-Fl."

MOTOR Parts Co., 229 W. Erie Ave., Chicago, Ill.

NEVER MISS—See Lockwood-Ash Motor Co.

NEW York Mica & Mfg. Co., Auburn, N. Y. "Auburn," "Wright."

OAKES & Dow Co., 15 Chardon St., Boston, Mass. "Comet," "Sootless."

OPTO—See Frontier Specialty Co.

OVERLAND Spark Plug Co., Boston, Mass.

PANTHER—See Faust Co.

PEERLESS—See Toledo Spark Plug Mfg. Co.

PERFECTION Specialty Mfg. Co., 115-17 W. Second Ave., Cincinnati, O.

PERFEX—See Samson Electric Co.

PERPETUAL Spark Plug Co., 330 E. Drinker St., Dunmore, Pa. "Ezekleen."

PITTSFIELD Spark Coil Co., Dalton, Mass. "Jewell." (See page 421.)

POWER & Efficiency Co., American & Mech. Bldg., Trenton, N. J.

R-M.—See Randall-Miller Co.

RAJAH Auto-Supply Co., Bloomfield, N. J. (See page 403.)

RAMBLE—See Long Bros.

RANDALL-FAICHNEY Co., Boston, Mass. "Blitz."

RANDALL-MILLER Co., 93 Massachusetts Ave., Boston, Mass. "R-M."

RED-HEAD—See Grossman Mfg. Co.

RED SEAL—See Faw, J. H.

RED SHIELD—See Wesco Supply Co.

REFLEX Ignition Co., 211 High Ave., Cleveland, O. "Arrow," "Lightning," "Lightning Kid."

RELIANCE—See Jeffery-Dewitt Co.

REX Ignition Mfg. Co., 1779 Broadway, New York, N. Y.

RIVAL—See Hampshire Mfg. Co.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco." (See page 139.)

SAMSON Electric Co., Canton, Mass. "Perfex."

SEE-DIG—See Superior Motor Specialty Co.

SHARP Spark Plug Co., 3343 Broadview Rd., Cleveland, O. "Firefly," "Goliath."

SILVEX Co., 171 Madison Ave., New York, N. Y. "Bethlehem," "Dragon."

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich. "Detroit."

SIOUX City Machine & Tool Co., First & Virginia Sts., Sioux City, Ia.

SNAPPON—See Bingham Mfg. Co.

SOOT PROOF—See Mezger, C. A.

SOOTLESS—See Oakes & Dow Co.

SPEEDWAY Plug Co., 1506 Harrison Ave., Cincinnati, O.

SPIT FIRE—See Mosler & Co.

SPLITDORF Electrical Co., Newark, N. J. "Common Sense." (See page 277.)

STA-RITE—See Sturdy Mfg. Co.

STAR Specialty Mfg. Co., 227-33 W. Erie St., Chicago, Ill. "Ajax," "Meteor."

STURDY Mfg. Co., 2637 Michigan Ave., Chicago, Ill. "Sta-Rite," "Gotham," "Vulcan," "Venus."

SUPERIOR Motor Specialty Co., 44 N. Fourth St. Philadelphia, Pa. "See-Dig."

SURE FIRE—See U. S. Auto Supply Co.

SZEL Import & Export Co., 359 Broadway, New York, N. Y. (Importers.) "Anchor."

T. A. D.—See Toledo Auto Devices Co.

THOMASSON Mfg. Co., Portland, Ia.

TITAN—See Champion Ignition Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

TOLEDO Spark Plug Mfg. Co., Factories Bldg., Toledo, O. "Peerless."

TRIUMPH—See Mosler & Co.

UKO—See Utility Co.

U. S. Auto Supply Co., 182 Grand River Ave., Detroit, Mich. "Sure Fire."

UTILITY Co., 636 W. 44th St., New York, N. Y. "Uko."

V-RAY Co., Marshalltown, Ia. "Mika."

VENUS—See Sturdy Mfg. Co.

Complete Index to Classification appears on Pages 8 to 26.

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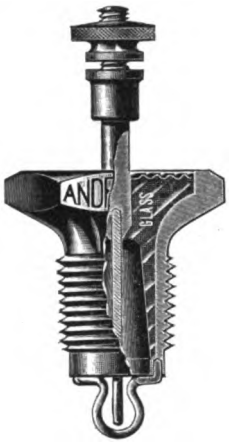
ANDERSON

GLASS AND STEEL SPARK-PLUG

A WELD OF GLASS AND STEEL



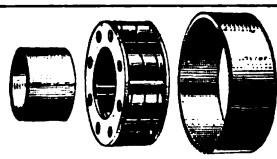
A WINDOW TO THE ENGINE

Better pay $1.50 once than a dollar a dozen times. That's about the ratio of Anderson Spark Plug life, compared with ordinary plugs.

ALL SIZES

Anderson Spark Plug Co.

206 North Holliday Street, Baltimore, Md.



The Component Parts of a Hyatt Quiet Bearing.

The small or inner race, on which the rollers operate, is made of special analysis alloy steel, heat treated and ground.

The cage contains the flexible spiral rollers that cushion road shocks, reduce noise, adjust irregularities in alignment and assure full line contact for the load. Rollers made of heat treated chrome nickel steel.

The large or outer race is made of the same material as the inner race and is mounted in the bearing housing.

The use of Hyatt Roller Bearings in your car insures dependable bearing service.

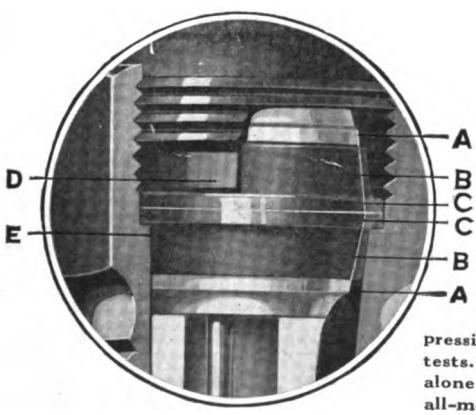
Two books, one about motorcar bearings in general for prospective purchasers, the other for automobile owners, will be sent on request

"Hyatt Quiet Bearings"

HYATT ROLLER BEARING CO.
DETROIT. CHICAGO
NEWARK, N.J.

HY-FLEX-ROL

The Hyatt Engineering Department in Detroit is always at your service.



JEFFERY-DEWITT CO.
DETROIT, MICH.

REG. U.S. PAT. OFF.

SPARK PLUGS

A complete line. Stand highest in heat, compression, breakage and electrical tests. Made of *J-D* porcelain, and alone possessing the famous *J-D* all-metal packing ring.

FORD SPECIAL
75 Cents

The mechanical construction of the packing is as follows: The Porcelains are formed with a shoulder in the shape of a double cone (A) (A) ground to a true and perfect surface. A packing collar (B) (B) with a flanged end (C) (C) made of a special alloy of the same expansion as porcelain, is forced on each of the cones (A) (A) until the two flanges (C) (C) meet.

The collar (C) (C) supports the Porcelain in the shell and takes all the strain of tightening the bushing.

This form of packing affords a ground joint and greatly increases the effective strength of the Porcelain, especially by the extension of the metal packing collar above and below the points of support in the shell.

Write for special literature, quotation, selling plans, etc. If you are in the market for a special brand plug—remember also that the Jeffery-Dewitt Co. is supplying over 300 dealers.

JEFFERY-DEWITT COMPANY 54 BUTLER AVENUE DETROIT - MICHIGAN

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PLUGS (Continued)

SPARK PLUGS (Continued)

VESUVIUS—See Mosler & Co.

VICTOR—See Beckley-Ralston Co.

VICTOR—See Milwaukee Auto Specialty Co.

VIM—See K-W Ignition Co.

VITAL—See Bigsby Mfg. Co.

VOLCANO Spark Plug Co., Ashland, O.

VULCAN—See Sturdy Mfg. Co.

WASCO—See Washington Automobile Supply Co.

WASHINGTON Automobile Supply Co., Washington, Ill. "Wasco."

WESCO Supply Co., Seventh St. & Clark Ave., St. Louis, Mo. "Red Shield."

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WIZARD—See Hampshire Mfg. Co.

WRIGHT—See New York Mica & Mfg. Co.

XXX Auto Accessory Co., Springfield, Mass.

YEXOD—See Doxey, N. D.

TIRE REPAIR PLUGS

BATAVIA Rubber Co., Batavia, N. Y.

GOODRICH Co., B. F., Akron, O.

TINGLEY & Co., Chas. O., Rahway, N. J.

YATMAN Rubber Co., 267-69 Mt. Pleasant Ave., Newark, N. J.

POCKETS

TRUCK STAKE POCKETS

DAYTON Malleable Iron Co., Dayton, O.

EBERHARD Mfg. Co., 2734 Tennyson Ave., Cleveland, O.

POINTS

SPARKING POINTS

(See also Platinum)

AMERICAN Platinum Works, 225-31 N. J. R. R. Ave., Newark, N. J.

BAKER & Co., Newark, N. J. (See page 461.)

BISHOP & Co. Platinum Works, J., Malvern, Pa.

COMMERCIAL Research Co., Tuckahoe, N. Y. "Comreco." (See page 461.)

COMRECO—See Commercial Research Co.

DRIVER-HARRIS Wire Co., Harrison, N. J. "Ignito."

ELECTRICAL Alloy Co., Morristown, N. J.

HEEREN Bros. & Co., Penn Ave. & Ellesmere St., Pittsburg, Pa.

IGNITO—See Driver-Harris Wire Co.

QUEEN-GRAY Co., 616-18 Chestnut St., Philadelphia, Pa.

ROESSLER & Hasslacher Chemical Co., 100 William St., New York, N. Y. (See page 461.)

POLISHES

AUTOMOBILE BODY POLISHES

(See also Soaps, Automobile)

A B C Reviver—See Standard Varnish Works.

A No. One—See International Polish Co.

A-S-K Co., 1932-34 W. Eighth St., Cincinnati, O.

ADAMS Grease & Oil Co., 161 W. 51st St., New York, N. Y. "Apollo."

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill. "Hy-Pol."

ADVANCE Oil Works, 310-12 Flushing Ave., Brooklyn, N. Y.

ALDER Chemical Co., Mt. Vernon, N. Y. "Star."

AMERICUS Products Co., Detroit, Mich.

APOLLO—See Adams Grease & Oil Co.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup." (See page 129.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ARROW—See Peterson Co.

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. (See page 131.)

AUTO-GLOSS—See Indianapolis Paint & Color Co.

AUTOGLOSS—See Sisk Mfg. Co.

AUTO-KLEAN—See Lucas & Co.

AUTO VAR—See Glazene Co.

AUTOCLEAN—See Bridgeport Wood Finishing Co.

B. P. S.—See Patterson-Sargent Co.

B-BRITE—See Polish Products Co.

BAILEYS—See Crown Mfg. Co.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BEN-HUR Metal Polish Co., 108 E. Market St., Crawfordsville, Ind.

BLUE RIBBON — See International Metal Polish Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

BOBRICK Chemical Co., 111-17 S. Garey St., Los Angeles, Cal. "Three X."

BODY-NU—See Nu-Back Mfg. Co.

BORNSCHEIN & Co., John F., 6304 Wallace St., Chicago, Ill. "Schein."

BOYER Chemical Laboratory Co., 8 E. Michigan St., Chicago, Ill.

BRIDGEPORT Wood Finishing Co., New Milford, Conn. "Autoclean."

BRILLIANT—See Werner-Service Mfg. Co.

BROOKS & Co., Clarence, 249-77 Chestnut St., Newark, N. J.

BUFFALO Specialty Co., 275 Ellicott St., Buffalo, N. Y. "Liquid Veneer."

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HERZ PLUG

"Bougie Mercedes"

In its 20th Year

No Porcelain

Absolutely Oil-proof

Absolutely Soot-proof

Double, Unbreakable Stone Insulation, instead of cracking porcelain; Four Sparking Points of Platinum-alloy; Self-cleaning Construction; and a Full Year's Absolute Guarantee—these are the features which account for the preference of experienced motorists for HERZ PLUG.

The Plug the users want is the Plug that pays the dealer. That means HERZ PLUG.

HERZ & CO., 245 West 55th St., New York

Makers of HERZ MAGNETO

LET US HELP BUILD YOUR CAR

We know a few manufacturers who strive to make as good a car as money can produce and ingenuity invent.

Then there are others, whose big aim is to make as much money as they can on each sale, regardless of value given or anything else.

You, Mr. Manufacturer, must belong to one of these two classes—there is no go-between.

Is it the latter? If so, then we cannot do business with you. But if you are trying to build a car that will make your name echo through the ages, we respectfully submit for your 1914 consideration

BENFORD'S Monarch Spark Plug

It will add the last touch of perfection to your motor, and will make it run like a top.

Don't take our word for this! Make us show you.

We will gladly submit samples to test. A post card will fetch them.

BENFORD MFG. COMPANY

Box "H" Mt. Vernon, New York

MULTIBESTOS Brake Lining

is made complete in our own factory. This is a fact worth considering, for it places upon us the full responsibility for quality. It compels us to obtain the highest grade material and to enforce that rigid inspection of both material and workmanship which assures to our customers the most complete satisfaction.

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Framingham, Mass.

Boston.....903 Boylston St.
New York.....276 Canal St.
Chicago.....1430 Michigan Boulevard
Philadelphia.....1427 Vine St.
San Francisco..Corner First & Howard Sts.

"Safe in the Grip of Multibestos"

"ALL-IN-ONE"

PRIMING SPARK PLUG

A Perfect Spark Plug
Perfect Priming Device

THE "ALL-IN-ONE" SPARK PLUG is the result of concentrated effort on the part of our organization to turn out the best and most efficient PRIMING PLUG on the market.

PRICE $1.25

FRONTIER SPECIALTY COMPANY

BUFFALO, NEW YORK

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POLISHES (Continued)

AUTOMOBILE BODY POLISHES (Continued)

CALLERY & Co., W. W., 188 36th St., Pittsburg, Pa.

CENTURY—See Arnstein, Eugene.

CHICAGO White Lead & Oil Co., 1454 S. Western Ave., Chicago, Ill.

CHIEF KOKOMOKO—See National Products Co.

CINCINNATI Oil Works Co., Cincinnati, O. "Re-Nu."
(See page 417.)

CLEANOLA Co., Fulton Bldg., Pittsburg, Pa.

COLUMBUS Varnish Co., Columbus, O. "Peerless."
(See page 281.)

CORTLAND Specialty Co., 174-78 Railroad St., Cortland, N. Y. "Houts."

CROWN Mfg. Co., Indianapolis, Ind. "Baileys."

CUNNINGHAM—See Pitt Specialty Co.

DAVIS Co., W. C., 237 N. Main St., Brockton, Mass. "Superior."

DIAMOND Specialty Co., Indianapolis, Ind.

DIAMOND Polish Co., Brown Bldg., Washington, Pa.

DOZIT—See Kirk Mfg. Co.

DULEN Mfg. Co., J. E., Springfield, Mo. "Dumaco."

DUMACO—See Dulen Mfg. Co.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

EBERSON Paint Co., 18th & Pine Sts., St. Louis, Mo.

ECLAT Mfg. Co., 3425 S. State St., Chicago, Ill.

EZYBRITE—See Rodriguez, R. E.

FAULTLESS—See Hawkey Oil Co.

FINALINE Mfg. Co., 5027 Delmar Blvd., St. Louis, Mo.

FLINT Varnish Works, Flint, Mich.

FRAZER Lubricator Co., 3921 Normal Ave., Chicago, Ill.

GEM Supply, 1036 S. Main St., Waterbury, Conn.

GLAZENE Co., 1330 W. Jackson Blvd., Chicago, Ill. "Auto Var."

GLISTENER Mfg. Co., 622 Cypress Ave., Kansas City, Mo. "Lee's." "Varnishine."

GOLDEN STAR—See Morris Mfg. Co.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HALLETT & Co., H. M., Ludington, Mich. "New Life."

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HEANEY Mfg. Co., 164 State St., Boston, Mass.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Nugloss."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

HOUTS—See Cortland Specialty Co.

HY-POL—See Adams & Elting Co.

INDIANAPOLIS Paint & Color Co., 118 W. Chesapeake St., Indianapolis, Ind. "Auto-Gloss."

INTERNATIONAL—See St. Louis Surfacer & Paint Co.

INTERNATIONAL Metal Polish Co., Quill St. & Belt R. R., Indianapolis, Ind. "Blue Ribbon."

INTERNATIONAL Polish Co., 367 Jefferson Ave., Rochester, N. Y. "A No. One."

JEWEL—See Wadsworth-Howland Co.

JIFFY Specialty Co., McKeesport, Pa.

KEEP-NEW—See Par-Kop Mfg. Co.

KIRK Mfg. Co., Gumbel Bldg., Kansas City, Mo. "Dozit."

LE DOYEN, Frank J., 827 Mangold St., Baltimore, Md. "Var-Noil."

LEE'S—See Glistener Mfg. Co.

LIGHTNING—See Warren Refining Co.

LIQUID VENEER—See Buffalo Specialty Co.

LORD Polish Co., F. T., 37 Hovey Ave., Cambridge, Mass. "Sun-Glo."

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa. "Auto-Klean."

LUSTRE Mfg. Co., 6 N. Clark St., Chicago, Ill.

McDOUGALL Varnish Co., Buffalo, N. Y.

MAGICLEAN—See Schmoeger, Frederic A.

MAJESTIC—See Suydam Co.

MARAC Co., 44 E. 23d St., New York, N. Y. "Marvel."

MARATHON—See Weinberg & Co.

MARVEL—See Marac Co.

MATCHLESS—See Standard Oil Co. of N. Y.

MEADOWCROFT Chemical Co., Saybrook, Conn. "Rite Brite."

MODOC Co., Drexel Bldg., Philadelphia, Pa.

MONARCH—See Suydam Co.

MONOGRAM—See New York Lubricating Oil Co.

MONROE Specialty Co., 347 W. Broadway, New York, N. Y. "Sunrise."

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O.

MORRIS Mfg. Co., R. W., Gumbel Bldg., Kansas City, Mo. "Golden Star."

NATIONAL Mfg. Co., 124 N. Edwards St., Kalamazoo, Mich.

NATIONAL Products Co., 8 Courtland Blk., Kokomo, Ind. "Chief Kokomoko."

NAY Chemical Co., Tom, Holden, Mo.

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill. "Relustro."
(See page 131.)

NEW LIFE—See Hallett & Co.

NEW Method Varnish Co., 210 W. Hudson St., Elmira, N. Y. "Uncle Hiram's."

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram."
(See page 275.)

NORTHWESTERN Chemical Co., Marietta, O.
(See page 129.)

NOXAL—See Noxall Polish Mfg. Co.

NOXALL Polish Mfg. Co., 1238 Belmont Ave., Philadelphia, Pa. "Noxal."

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Solve the light delivery problem.
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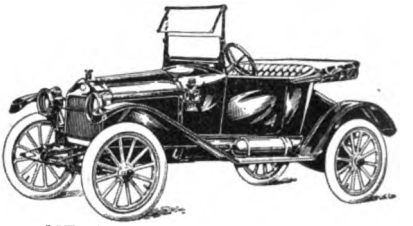

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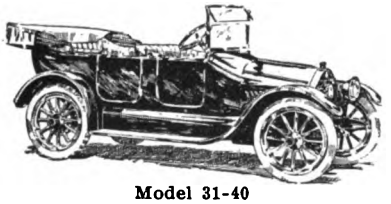

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POLISHES (Continued)

AUTOMOBILE BODY POLISHES (Continued)

NU-BACK Mfg. Co., 114 N. Commercial St., St. Louis, Mo. "Body-Nu."

NUBIAN Paint & Varnish Co., 1856 Le Claire Ave., Chicago, Ill. "Re-Vi-Var."

NUGLOSS—See Hollingshead Co.

ORIENTAL Enamel Co., 963 W. Sixth St., Long Beach, Cal.

OSMACO—See Schlegel Mfg. Co.

PAR-KOP Mfg. Co., Broad St. & Ridge Ave., Philadelphia, Pa. "Keep-New."

PATTERSON-SARGENT Co., E. 38th & St. Clair Sts., Cleveland, O. "B. P. S."

PEERLESS—See Columbus Varnish Co.

PERUVIAN—See Sweet, Charles F.

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PIMBLEY Paint & Glass Co., St. Joseph, Mo.

PITT Specialty Co., 1016 Congress St., N. S., Pittsburg, Pa. "Cunningham."

POLISH Products Co., 815-17 E. 21st St., Kansas City, Mo. "B-Brite."

POUGHKEEPSIE Utilities Corp., 3840 Winnikee Ave., Poughkeepsie, N. Y. "Utility."

PREMIUM—See Blue Ribbon Mfg. Co.

PURE Oil Co., First St. & 13th Ave., S., Minneapolis, Minn. "Puritan."

PURITAN—See Pure Oil Co.

RAPID—See Shannon, T. R.

RATH Mfg. Co., Hedley & Richmond Sts., Philadelphia, Pa.

RELUSTRO—See Nemo Chemical & Specialty Mfg. Co.

RE-VI-VAR—See Nubian Paint & Varnish Co.

RIE-NIE—See Durkee-Atwood Co.

RITE-BRITE—See Meadowcroft Chemical Co.

RODRIGUEZ, R. E., 56-58 Warren St., New York, N. Y. "Ezy Brite."

ROYAL Lubricating Oil Co., 116 Broad St., New York, N. Y.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y.

ST. LOUIS Surfacer & Paint Co., Arlington Ave. & Terminal Belt Line, St. Louis, Mo. "International."

SCHEIN—See Bornschein & Co.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y. "Osmaco."

SCHMOEGER, Frederic A., Sterling, Ill. "Magiclean."

SHANNON, T. R., 19 Lorraine St., Hartford, Conn. "Rapid."

SHINAUTO Mfg. Co., 1422 N. Illinois St., Indianapolis, Ind.

SILCO—See Silvex Co.

SILVEX Co., 171 Madison Ave., New York, N. Y. "Silco."

SISK Mfg. Co., R. J., New London, Conn. "Autogloss."

SLIKUP—See Arnold, N. B.

SPARKLER Mfg. Co., 108 Main St., Fairmount, Ind.

STANDARD Oil Co. of N. Y., New York, N. Y. "Matchless."

STANDARD Varnish Works (Elm Park), Port Richmond, N. Y. "A B C Reviver."

STAR—See Alder Chemical Co.

SUN-GLO—See Lord Polish Co.

SUNRISE—See Monroe Specialty Co.

SUPERIOR—See Davis Co.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass.

SUYDAM Co., M. B., 61st & Butler Sts., Pittsburg, Pa. "Monarch," "Majestic."

SWEET, Charles F., 247 State St., Hartford, Conn. "Peruvian."

THREE X—See Bobrick Chemical Co.

THUMB, E. W., 872 Orleans St., Chicago, Ill.

U-AUTO-VARNISH Co., 345 The Arcade, Cleveland, O.

ULRICH & Co., E. North & Rose Sts., Buffalo, N. Y. "A-O-K."

UNCLE HIRAM'S—See New Method Varnish Co.

UTILITY—See Poughkeepsie Utilities Corp.

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

VAR-NOIL—See Le Doyen, Frank J.

VARNI-SHINE Co., Columbus, O.

VARNISHINE—See Glistener Mfg. Co.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WARREN Refining Co., 1137 W. 11th St., Cleveland, O. "Lightning."

WEINBERG & Co., J. H., 128 Maiden Lane, New York, N. Y. "Marathon."

WERNER-SERVICE Mfg. Co., 263 Fairmount Ave., Jersey City, N. J. "Brilliant."

WONDER WORKER—See Hall-Thompson Co

METAL POLISHES

A. & R. Co., Wallingford, Conn.

A-O-K—See Ulrich & Co.

A-S-K Co., 1932-34 W. Eighth St., Cincinnati, O.

ACME Polish Co., 71 S. 12th St., Pittsburg, Pa. "Ayrolite."

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill. "Shinite."

ADVANCE Oil Works, 310-12 Flushing Ave., Brooklyn, N. Y.

AJAX—See Crowell Chemical Co.

AMALIE—See Sonneborn Sons.

AMERICAN—See Harvey Chemical Co.

AMERICAN Metal Polish Co., 89 Winslow Ave., W., West Somerville, Mass. "North Star," "Meyers."

AMERICAN Oil & Disinfectant Co., 196 Water St., New York, N. Y. "Sparrow."

AMERICUS Products Mfg. Co., Detroit, Mich.

ANCHOR—See Hoffman Paint & Varnish Co.

APEX POLISHINE—See Millers Sons Co.

ARCO SPOTZOFF—See Atlantic Refining Co.

ARMIGER Chemical Co., 2155-57 Austin Ave., Chicago, Ill. "Rex."

ARMY & NAVY—See Grady Mfg. Co.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 129.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Shine-All."

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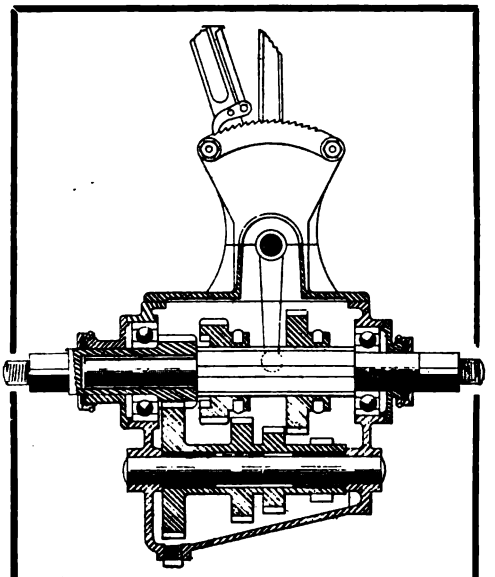

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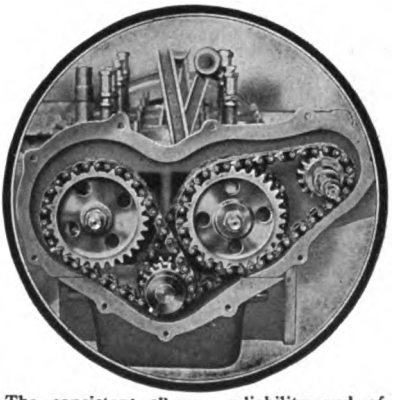

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POLISHES (Continued)

METAL POLISHES (Continued)

ARROW—See Peterson Co.

ATLANTIC Refining Co., Euclid Ave. & E. 65th St., Cleveland, O. "Arco Spotzoff."

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Sunshine."
(See page 131.)

AUBURN Specialties Co., 3 N. Green St., Auburn, N. Y. "Blitz."

AUTO Bright Mfg. Co., 210 Main St., Buffalo, N. Y.

AYROLITE—See Acme Polish Co.

B-BRITE—See Polish Products Co.

BAILEYS—See Crown Mfg. Co.

BAR-NIC—See Barcy-Nicholson Co.

BARCY-NICHOLSON Co., 845 Fort St., W., Detroit, Mich. "Bar-Nic."

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BEACON—See Cincinnati Oil Works Co.

BELL—See Reid Mfg. Co.

BELL Mfg. Co., Maine & Gratiot Sts., St. Louis, Mo. "Star."

BELL Oil Co., 53 E. Ferry St., St. Louis, Mo. "Liberty Bell."

BEN Hur Metal Polish Co., 108 E. Market St., Crawfordsville, Ind.

BERTRAM—See New Jersey Paint Works.

BLACK Silk Stove Polish Works, Sterling, Ill.

BLITZ—See Auburn Specialties Co.

BLUE RIBBON—See International Metal Polish Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Peerless," "Kantburn," "Premium."

BOBRICK Chemical Co., 111-17 S. Garey St., Los Angeles, Cal. "Radium," "E. Z. Q."

BOWMAN-EDSON Co., M. K., 64 Dey St., New York, N. Y. "Edsonia."

BRASS-NU—See Nu-Back Mfg. Co.

BRIDGEPORT Wood Finishing Co., New Milford, Conn. "Metalshine."

BRIGGS & Co., John, 45 Purchase St., Boston Mass. "Hub."

BRITE-LITE—See Pure Oil Co.

BRYT-O—See Clayton-Lindsay Co.

BUFFALO—See Ulrich & Co.

BULLY—See Weinberg & Co.

BURNISHINE—See Paul & Co.

C. P.—See Chicago Polish Co.

CALLERY & Co., W. W., 188 36th St., Pittsburg, Pa. "Winterton."

CAR-BRITE—See Lord Polish Co.

CENTURY—See Davey & Co.

CHAMBERLAIN Co., Sixth Ave. & Grant St., Pittsburg, Pa. "Desolvo."

CHEMICAL Supply Co., 1565 Merwin St., Cleveland, O.

CHICAGO Polish Co., 3715-19 Grand Ave., Chicago, Ill. "C. P."

CHICAGO White Lead & Oil Co., 1454 S. Western Ave., Chicago, Ill.

CHIEF KOKOMOKO—See National Products Co.

CINCINNATI Oil Works Co., Cincinnati, O. "Beacon."
(See page 417.)

CLAYTON-LINDSAY Co., 352 Central Ave., East Orange, N. J. "Bryt-o."

CLEANER Mfg. Co., 2842 Olive St., St. Louis, Mo. "Polishine."

CLEANOLA Co., Fulton Bldg., Pittsburg, Pa. "Spe-De-Shyne."

COLGAN Mfg. & Supply Co., 42 South St., New York, N. Y. "Peerless," "Crescent."

COLUMBIA—See Stevens, Frederic B.

CORLISS Supply Co., 118 Walnut St., St. Louis, Mo.

CRESCENT—See Colgan Mfg. & Supply Co.

CROWELL Chemical Co., 9 Oxford Terrace, Beverly, Mass. "Oxford," "Ajax."

CROWN Mfg. Co., Indianapolis, Ind. "Baileys."

DAVEY & Co., 2600 Grand Ave., Chicago, Ill. "Puritan," "Century."

DAY Mfg. Co., S. A., Demon St., Buffalo, N. Y. "Zircon."

DESOLVO—See Chamberlain Co.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich. "Rogers."

DIAMOND Polish Co., Brown Bldg., Washington, Pa.

DIAMOND Specialty Co., Indianapolis, Ind.

DIELECTRIC Mfg. Co., 224 S. Vandeventer Ave., St. Louis, Mo.

DOZIT—See Kirk Mfg. Co.

DRAGON—See Paul & Co.

E. Z. Q.—See Bobrick Chemical Co.

EAGLE Oil & Supply Co., Boston, Mass. "Eagleine."
(See page 273.)

EAGLEINE—See Eagle Oil & Supply Co.

EAVENSON & Sons, J., Delaware & Penn Sts., Camden, N. J. "Jesco."

EDSONIA—See Bowman-Edson Co.

ERICKA Mfg. Co., 332 Liberty St., Springfield, Mass. "Shineaul."

ESSEX Paint Works, Essex, Conn.

FAULTLESS—See Hawkeye Oil Co.

FEINER Chemical Mfg. Co., 238 Mill St., Springfield, Mass. "Rub-Less."

FIEBING Chemical Co., 238-40 Reed St., Milwaukee, Wis. "Lusterine."

FIREBALL Gas Tank & Illuminating Co., 5010 Delmar Blvd., St. Louis, Mo.

FORD & DEENEN—See Richmond & Co.

FRAZER Lubricator Co., 3921 Normal Ave., Chicago, Ill.

GARRATT-CALLAHAN Co., 37 S. Clinton St., Chicago, Ill.

GERMAN—See Sutherland & Co.

GLAD RAGS—See Silvex Co.

GLISTENER Mfg. Co., 622 Cypress Ave., Kansas City, Mo. "Lee's."

GLITTERSHINE—See Grady Mfg. Co.

GLOBE—See Raimes & Co.

GOLD MEDAL—See Hoffman Co.

GOLDEN GLITTER—See Mooney Co.

GOLDEN SCEPTRE—See Rath Mfg. Co.

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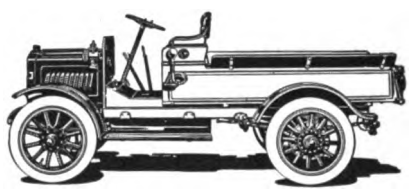

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POLISHES (Continued)

METAL POLISHES (Continued)

GOLDEN STAR—See Morris Mfg. Co.

GOLDSHINE—See Van Tilburg Oil Co.

GRADY Mfg. Co., 250-56 Ely Ave., Long Island City, N. Y. "Glittershine," "Scouree," "Army & Navy." (See page 307.)

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker," "Nick-E-Lo."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I. "Scouree."

HARVEY Chemical Co., 216 N. Fifth St., La Fayette, Ind. "American."

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HEANEY Mfg. Co., 164 State St., Boston, Mass.

HERCULES Chemical Works, 2138 W. Van Buren St., Chicago, Ill. "Non-Such."

HIGHSHINE—See Rath Mfg. Co.

HINDS & Coon, 124-26 Pearl St., Boston, Mass. "Ruby-Rub."

HOFFMAN Co., Geo. Wm., 557 E. Washington St., Indianapolis, Ind. "U. S." "Gold Medal."

HOFFMAN Paint & Varnish Co., 8 Medford St., Boston, Mass. "Anchor."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HUB—See Briggs & Co.

HYGLO—See Stanley, John T.

IMPERIAL—See Rath Mfg. Co.

INDIANAPOLIS Paint & Color Co., 118 W. Chesapeake St., Indianapolis, Ind. "Metal-Brite."

INTERNATIONAL—See St. Louis Surfacer & Paint Co.

INTERNATIONAL Metal Polish Co., Quill St. & Belt R. R., Indianapolis, Ind. "Blue Ribbon."

J-M METALLO—See Johns-Manville Co.

JESCO—See Eavenson & Sons.

JEWEL—See Wadsworth-Howland Co.

JIFFY Specialty Co., McKeesport, Pa.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M Metallo."

KANTBURN—See Blue Ribbon Mfg. Co.

KETTLER Brass Mfg. Co., 109 Fairview St., Houston, Tex. "Qck Work."

KIRK Mfg. Co., Gumbel Bldg., Kansas City, Mo. "Dozit."

KOSMOS—See Mulliken Oil Co.

LEE'S—See Glistener Mfg. Co.

LIBERTY BELL—See Bell Oil Co.

LIGHTNING Flash Specialty Co., Harrison & Garrard Aves., Cincinnati, O.

LORD Polish Co., F. T., 37 Hovey Ave., Cambridge, Mass. "Lumino," "Car-Brite."

LUMINO—See Lord Polish Co.

LUSTERINE—See Fiebing Chemical Co.

McLEAN-JONES Oil & Supply Co., 40 Indian Wharf, Boston, Mass. "Nox-All."

MACLAREN Imperial Cheese Co., Detroit, Mich. "Redio."

MAGIC—See Sweet, Charles F.

MAGICLEAN—See Schmoeger, Frederic A.

MARATHON—See Weinberg & Co.

MATCHLESS Metal Polish Co., 149 Varick St., New York, N. Y. "Mexoline," "Tripoline."

MAXINE—See Rexine Co.

METAL-BRITE—See Indianapolis Paint & Color Co.

METALSHINE—See Bridgeport Wood Finishing Co.

MEXOLINE—See Matchless Metal Polish Co.

MEYERS—See American Metal Polish Co.

MILLERS Sons Co., A. D., Columbus & Preble Aves., Pittsburg, Pa. "Apex Polishine."

MODOC Co., Drexel Bldg., Philadelphia, Pa.

MONARCH—See Suydam Co.

MOONEY Co., A. J., 250 Ely Ave., Long Island City, N. Y. "Golden-Glitter."

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O. "Mooreshine."

MOORESHINE—See Moore Oil Co.

MORGAN Mfg. Co., John St., Newport, R. I.

MORRIS Mfg. Co., R. W., Gumbel Bldg., Kansas City, Mo. "Golden Star."

MULLIKEN Oil Co., 200 Friend St., Boston, Mass. "Kosmos."

NARRAGANSETT Chemical Co., 155-61 Orange St., Providence, R. I. "Reflectolite."

NATIONAL Cement & Rubber Co., 300-16 S. St. Clair St., Toledo, O.

NATIONAL Mfg. Co., 124 N. Edwards St., Kalamazoo, Mich.

NATIONAL Products Co., 8 Courtland Blk., Kokomo, Ind. "Chief Kokomoko."

NATIONAL Valgrinok Co., 195 Church St., Newton, Mass. "Valgrinok."

NAY Chemical Co., Tom, Holden, Mo.

NEW Era Mfg. Co., Kalamazoo, Mich.

NEW Jersey Paint Works, Jersey City, N. J. "Bertrams."

NICK-E-LO—See Hall-Thompson Co.

NON-SUCH—See Hercules Chemical Works.

NORTH STAR—See American Metal Polish Co.

NORTHWESTERN Chemical Co., Marietta, O. (See page 129.)

NOX-ALL—See McLean-Jones Oil & Supply Co.

NOXAL—See Noxall Polish Mfg. Co.

NOXALL Polish Mfg. Co., 1238 Belmont Ave., Philadelphia, Pa. "Noxal."

NOXON Metal Polish Co., Hoboken, N. J.

NU-BACK Mfg. Co., 114 N. Commercial St., St. Louis, Mo. "Brass-Nu."

OIL Products Co., 17 Battery Pl., New York, N. Y. "Usoline."

OSMACO—See Schlegel Mfg. Co.

OXFORD—See Crowell Chemical Co.

PATTERSON Lubricating Co., 114 Broad St., Boston, Mass.

Complete Index to Classification appears on Pages 8 to 26.

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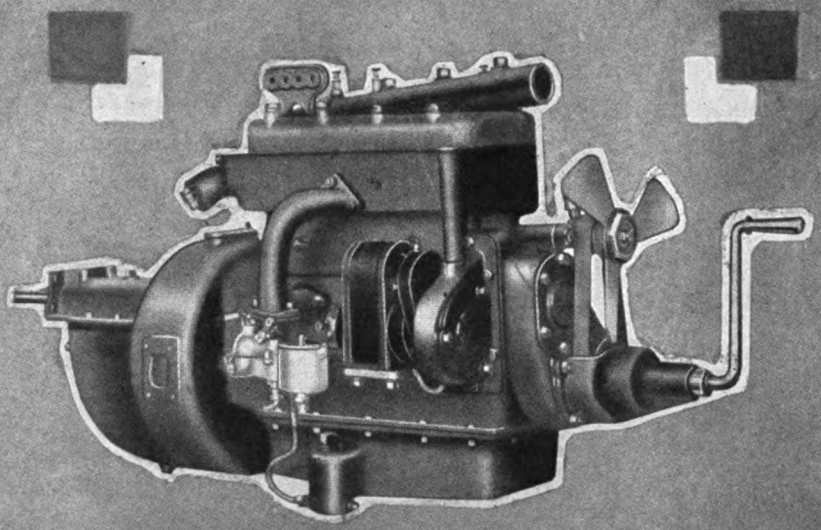
The FARMER ENGINE



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The **FARMER ENGINE** in power, smoothness of operation, length of time and economical fuel consumption is all that can be desired.

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POLISHES (Continued)

METAL POLISHES (Continued)

PAUL & Co., J. C., Chicago, Ill. "Burnishine," "Dragon."

PEERLESS—See Blue Ribbon Mfg. Co.

PEERLESS—See Colgan Mfg. & Supply Co.

PENN Petroleum Co., 115-17 N. Second St., Philadelphia, Pa. "Primus."

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PIONEER Mfg. Co., 5220 Sweeney Ave., S. E., Cleveland, O. "Shino."

POLESHINE—See Cleaner Mfg. Co.

POLISH Products Co., 815-17 E. 21st St., Kansas City, Mo. "B-Brite."

PREMIUM—See Blue Ribbon Mfg. Co.

PRIMUS—See Penn Petroleum Co.

PURE Oil Co., First St. & 13th Ave., S., Minneapolis, Minn. "Brite-Lite."

PURITAN—See Davey & Co.

PURITAN Soap Co., Rochester, N. Y. (See page 361.)

QCK WORK—See Kettler Brass Mfg. Co.

RADIUM—See Bobrick Chemical Co.

RAIMES & Co., 50 Ferry St., New York, N. Y. "Globe."

RATH Mfg. Co., Hedley & Richmond Sts., Philadelphia, Pa. "Imperial," "Golden Sceptre," "Staraline," "Highshine," "Swiss."

RAYDO—See Ulrich & Co.

RAYO Co., 5 Nassau St., New York, N. Y.

RED CROSS—See Robertson & Co.

REDIO—See MacLaren Imperial Cheese Co.

REFLECTOLITE—See Narragansett Chemical Co.

REID Mfg. Co., W. W., 205 Milk St., Boston, Mass. "Bell," "Zip."

RELIABLE Cement Co. (E. Akron), Akron, O.

REX—See Armiger Chemical Co.

REXINE Co., Sheboygan, Wis. "Maxine."

RICHMOND & Co., C. C., 40 Batterymarch St., Boston, Mass. "Ford & Denneen."

ROBERTSON & Co., 1141 W. Madison St., Chicago, Ill. "Red Cross."

ROGERS—See Detroit White Lead Works.

ROYAL Lubricating Oil Co., 116 Broad St., New York, N. Y.

RUB-LESS—See Feiner Chemical Mfg. Co.

RUBY-RUB—See Hinds & Coon.

ST. LOUIS Surfacer & Paint Co., Arlington Ave. & Terminal Belt Line, St. Louis, Mo. "International."

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y. "Osmaco."

SCHMOEGER, Frederic A., Sterling, Ill. "Magiclean."

SCOUREE—See Grady Mfg. Co.

SCOUREE—See Harris Oil Co.

SHINAL—See Adams & Elting Co.

SHINE-ALL—See Arnstein, Geo. W.

SHINE-M-UP—See Simplex Auto Specialty Co.

SHINEAUL—See Ericka Mfg. Co.

SHINITE—See Adams & Elting Co.

SHINO—See Pioneer Mfg. Co.

SILVEX Co., 171 Madison Ave., New York, N. Y. "Glad Rags."

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich. "Shine-m-up."

SLIKUP—See Arnold, N. B

SOLARINE Co., 153-55 N. Carpenter St., Chicago, Ill.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SPARROW—See American Oil & Disinfectant Co.

SPE-DE-SHYNE—See Cleanola Co.

SPEARE'S Sons Co., Alden, 140 Sixth St., Boston, Mass.

STANLEY, John T., 642 W. 30th St., New York, N. Y. "Hyglo." (See page 361.)

STAR—See Bell Mfg. Co.

STARALINE—See Rath Mfg. Co.

STAY-BRIGHT Lacquer Co., 58 W. Washington St., Chicago, Ill.

STEVENS, Frederic B., Detroit, Mich. "Columbia." (See pages 523 and 524.)

SUMMERSHINE Mfg. Co., 250 Ely Ave., Long Island City, N. Y.

SUNSHINE—See Atlas Auto Supply Co.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "German."

SUYDAM Co., M. B., 61st & Butler Sts., Pittsburg, Pa. "Monarch."

SWEET, Charles F., 247 State St., Hartford, Conn. "Magic."

SWISS—See Rath Mfg. Co.

TRAFTON Co., F. M., 176 Federal St., Boston, Mass.

TRIPOLINE—See Matchless Metal Polish Co.

ULRICH & Co., E. North & Rose Sts., Buffalo, N. Y. "A-O-K," "Buffalo," "Raydo."

UKO—See Utility Co.

U. S.—See Hoffman Co.

USOLINE—See Oil Products Co.

UTILITY Co., 636 W. 44th St., New York, N. Y. "Uko."

VALGRINOK—See National Valgrinok Co.

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

VAN Tilburg Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Wang."

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WANG—See Van Tilburg Oil Co.

WARREN Refining Co., 1137 W. 1th St., Cleveland, O.

WEINBERG & Co., J. H., 128 Maiden Lane, New York, N. Y. "Bully," "Marathon."

WHIZ—See Hollingshead Co.

WINN, Wm. R., 143 Maiden Lane, New York, N. Y. "Winnout."

WINNOUT—See Winn, Wm. R.

WINTERTON—See Callery & Co.

WONDER WORKER—See Hall-Thompson Co.

YALE—See Rostand Mfg. Co.

YOUNG, Orlando W., 277 Halsey St., Newark, N. J.

ZIP—See Reid Mfg. Co.

ZIRCON—See Day Mfg. Co.

Complete Index to Classification appears on Pages 8 to 26.

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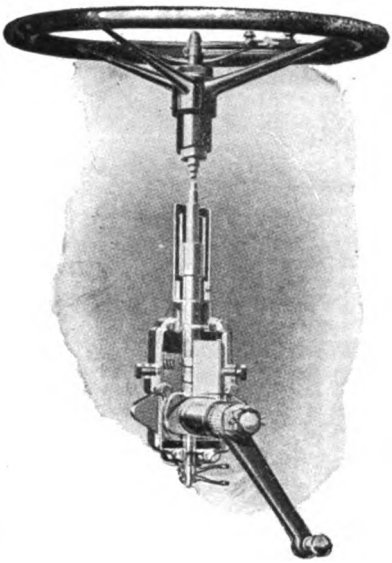

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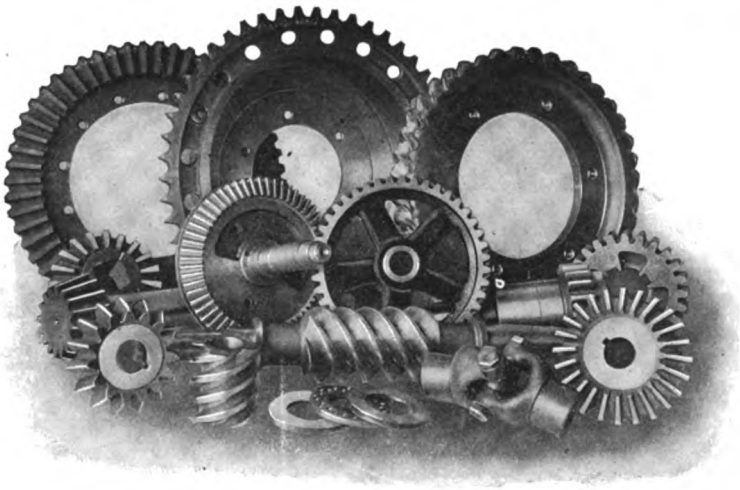

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ARTISTIC Porcelain Co., Trenton, N. J.

EMPIRE China Works, 142-56 Green St., Brooklyn, N. Y.

GENERAL Porcelain Co., East Liverpool, O.

HARTFORD Faience Co., Hartford, Conn.

IMPERIAL Porcelain Works, Mulberry St. & New York Ave., Trenton, N. J.

J-D—See Jeffery-DeWitt Co.

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich. "J-D."
(See pages 301 and 315.)

NATIONAL Porcelain Co., Trenton, N. J.

STAR Porcelain Co., Trenton, N. J.
(See page 315.)

PRIMERS

GASOLINE ENGINE PRIMERS

(See Heaters, Mixture; also Starters)

A. & G. Mfg. Co., West Newton, Mass.

ATKINS Carbureter Co., Dwight, Ill.

AUTOMATIC Appliance Co., 172 Columbus Ave., Boston, Mass. "Boston."
(See page 379.)

AUTOMATIC Device Co., 551 E. Jefferson St., Frankfort, Ind. "Economy."

BOSTON—See Automatic Appliance Co.

BUCKEYE—See Central Brass & Fixture Co.

BULLOCK Engine Co., 143 N. Wabash Ave., Chicago, Ill. "Irish."

CENTRAL Brass & Fixture Co., N. Fountain Ave., Spingfield, O. "Buckeye."

CHI-FAU-CO—See Chicago Faucet Co.

CHICAGO Faucet Co., 313 S. Clinton St., Chicago, Ill. "Chi-Fau-Co."

COLONIAL Auto & Supply Co., 101 W. 66th St., New York, N. Y.

CONSOLIDATED Gas & Electric Co., 552 W. Lake St., Chicago, Ill. "Economy."

CRARY Co., 650-52 Woodward Ave., Detroit, Mich. "Jiffy."

CRONE, F. G., 334 Genesee St., Buffalo, N. Y.

CRUM-WILEY Mfg. Co., Peru, Ind. "Ideal."

DUELEC—See Traub, U. S.

ECONOMY—See Automatic Device Co.

ECONOMY—See Consolidated Gas & Electric Co.

EDGE Auto Device Co., Edgewater Park, N. J. "Neverfail."

EUREKA Primer & Gasoline Saver Co., 1415 S. Harrison St., Fort Wayne, Ind.

GILSON Motor Starting Co., 1407-09 N. Illinois St., Indianapolis, Ind.

HAGSTROM Bros. Mfg. Co., Lindsborg, Kans.

HENDRICKS Ad-A-Man-Tor Co., Grand Rapids, Mich.

HILL-STAGE Co., 604 Jackson St., Anderson, Ind.

HULL Electric Co., R. C., 1822 Euclid Ave., Cleveland, O.

IDEAL—See Crum-Wiley Mfg. Co.

IDEAL—See Interstate Auto Accessory Co.

IDEAL Brass Works, Tenth & Canal Sts., Indianapolis, Ind.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

INDIANA Equipment Co., State Life Bldg., Indianapolis, Ind.

INTERSTATE Auto Accessory Co., 2124 E. Washington St., Indianapolis, Ind. "Ideal."

IRISH—See Bullock Engine Co.

JIFFY—See Crary Co.

KELLOGG Mfg. Co., Rochester, N. Y.
(See page 527.)

KELSEY, F. H., 1841 Euclid Ave., Cleveland, O. "Krank-Less."

KRANK-LESS—See Kelsey, F. H.

KRANK-LESS Co., Citizens Bldg., Cleveland, O.

LYDON Mfg. Co., 514 Michigan Ave., Chicago, Ill.

NATIONAL Mfg. Co., 124 N. Edwards St., Kalamazoo, Mich.

NATIONAL Motor Primer Co., Best Bldg., Rock Island, Ill.

NELSON Mfg. Co., 4529 State St., Chicago, Ill.

NEVERFAIL—See Edge Auto Device Co.

OATHOUT, Chas. M., Saugerties, N. Y.

PERKINS Appliance Co., 539 Worthington St., Springfield, Mass.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.
(See page 509.)

TRAUB, U. S., 14 N. Broadway, Yonkers, N. Y. "Duelec."

VIM Mfg. Co., Clark Ave. & 61st St., Cleveland, O.

WELD Mfg. Co., North Chatham, Mass.

PROPS

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(See Jacks, Car Supporting)

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ATLAS Specialty Mfg. Co., 219-21 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

NIAGARA Fabric Mfg. Co., 524 W. 50th St., New York, N. Y.

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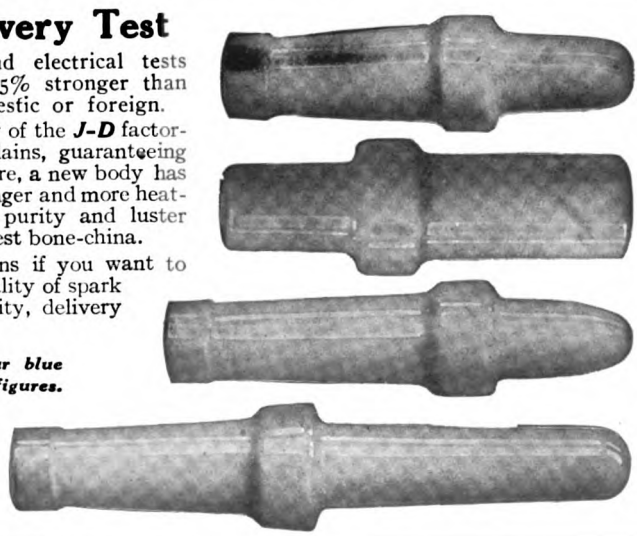

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PULLEYS

PULLEYS AND SHEAVES

(See Sheaves and Pulleys)

PUMPS

ENGINE DRIVEN TIRE PUMPS

A.B.C.—See Artizan Brass Co.

ADVANCE Machinery Co., 517-29 Hamilton St., Toledo, O. "Aero."

AERO—See Advance Machinery Co.

ARISTO—See Eagle Mfg. Co.

ARTIZAN Brass Co., 218 N. Jefferson St., Chicago, Ill. "A.B.C."

AUTO Air-Rotor Co., 10 Garden St., Auburn, N. Y. "Ten-Eyck."

B. B.—See Herz & Co.

BASTIAN—See General Utility Co.

BLOOM-WALLACE Co., Bowles Bldg., Detroit, Mich.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

COE-STAPLEY Mfg. Co., 1565 Railroad Ave., Bridgeport, Conn. "Kinney."

COLSTAD Sales Co., 126 Massachusetts Ave., Boston, Mass.

DAVIS Mfg. Co., D. L., 733 Marquette Bldg., Chicago, Ill.
(See page 317.)

DEWEY-ANDERSON Mfg. Co., 456 Woodruff Ave., Toledo, O.
(See page 317.)

EAGLE Mfg. Co., 651-67 Blue Rock St., Cincinnati, O. "Aristo."

E-Z—See Wheaton & Co.

FOLBERTH Auto Specialty Co., Lake Ave. & W. 80th St. N. W., Cleveland, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

GENERAL Tool Co., 59 Terrace St., Buffalo, N. Y. "Spencer."

GENERAL Utility Co., 1326-30 Ogden St., Philadelphia, Pa. "Bastian."

GREEN & Swett Co., 737 Boylston St., Boston, Mass. "Tri-Phoon."

HANNA—See Troy Auto Specialty Co.

HANS Motor Equipment Co., La Crosse, Wis.

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn. "Master."
(See page 297.)

HERT Mfg. Co., Indianapolis, Ind. "Purair."

HERZ & Co., 245 W. 55th St., New York, N. Y. "B. B.," "Tandem."
(See page 303.)

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill. "Utility."

KELLOGG Mfg. Co., Rochester, N. Y.
(See page 527.)

KENMORE Mfg. Co., 15 N. Crawford Ave., Chicago, Ill.

KINGSTON—See Kokomo Electric Co.

KINNEY—See Coe-Stapley Mfg. Co.

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

LIPMAN Air Appliance Co., Beloit, Wis.

M-P—See National United Service Co.

M. & L.—See McCarrell & Hawley.

MANZEL, Charles W., 319 Babcock St., Buffalo, N. Y.

MANZEL Bros. Co., 320 Babcock St., Buffalo, N. Y.
(See page 317.)

MARVEL Auto Supply Co., 1220 W. Sixth St., Cleveland, O.

MASTER—See Hartford Machine Screw Co.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

MEDINA Machine Co., Medina, O.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O.

NATIONAL United Service Co., Detroit, Mich. "M-P."
(See page 391.)

NOIL—See Taylor Mfg. Co.

O. B.—See Universal Mfg. Co.

P. T. C.—See Pacific Tucking & Mfg. Co.

PACIFIC Tucking & Mfg. Co., 471-73 18th St., Brooklyn, N. Y. "P.T.C."

PEERLESS Accessories Manufacturers, 1926 S. Wabash Ave., Chicago, Ill.

PERFECTION Auto Pump Co., Auburn, N. Y.

PURAIR—See Hert Mfg. Co.

RACINE Engine & Machinery Co., Racine, Wis. "Two Minute."

ROHRBACHER Automatic Air Pump Co., 173 E. Water St., Portland, Ore.

SMITH, Irwin C., 925 Santee St., Los Angeles, Cal.

SMITH Motor Devices Co., Dolgeville, N. Y.

SPENCER—See General Tool Co.

STEWART-WARNER Speedometer Corp., 1904 Diversey Blvd., Chicago, Ill.
(See page 365.)

TANDEM—See Herz & Co.

TAYLOR Mfg. Co., P. O. Box 485 B. A., Chicago, Ill. "Noil."
(See page 317.)

TEN-EYCK—See Auto Air-Rotor Co.

TRI-PHOON—See Green & Swett Co.

TROY Auto Specialty Co., Troy, N. Y. "Hanna."

TWO MINUTE—See Racine Engine & Machinery Co.

UNION Auto Specialties Co., Brookville, Pa.

UNIVERSAL Mfg. Co., 308-12 Ninth St., S., Minneapolis, Minn. "O. B."

UTILITY—See Hill Pump Valve Co.

WHEATON & Co., C. M. Sunbury, Ohio. "E-Z."

HAND TIRE PUMPS

AEOLUS—See Bridgeport Brass Co.

AERTITE—See Keystone Novelty Co.

AMERICAN Carboneter Co., 1514 Michigan Ave., Chicago, Ill. "Folikie."

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The "Automatic" Tire Inflator will inflate your tires while at rest or in motion, and keep them at the desired pressure.

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Your customers will appreciate your selling them such an efficient tire pump.

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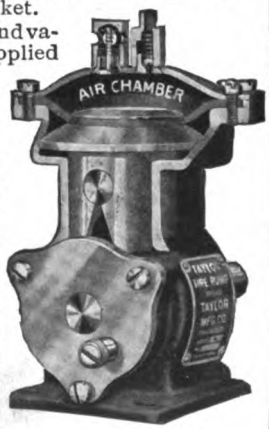
Excludes all oil and vapor from tube—applied in a jiffy.



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HAND TIRE PUMPS (Continued)

ANTHONY Co., 138 West Ave., Long Island City, N. Y.

APEX Electric Mfg. Co., 1410 W. 59th St., Chicago, Ill.

ATLAS—See Bridgeport Brass Co.

BELL Pump Co., 74-78 Fort St., E., Detroit, Mich.
(See page 475.)

BINKS—See Star Brass Works.

BISHOP-BABCOCK-BECKER Co., Cleveland, O.

BLIZZARD—See Bridgeport Brass Co.

BOSS—See Cox Brass Mfg. Co.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. "Stapley," "Æolus," "Atlas," "Windjammer," "Crown."
(See page 319.)

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

BUFFALO Auto Accessory Mfg. Co., 369 Ellicott St., Buffalo, N. Y. "Apex," "Zenith," "Magic."

CARVER—See Osborne & Stephenson Mfg. Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Springfield."

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

COE-STAPLEY Mfg. Co., 1565 Railroad Ave., Bridgeport, Conn. "Rex," "Little Giant."

COLUMBIA—See Judd & Leland Mfg. Co.

COX Brass Mfg. Co., Albany, N. Y. "Boss," "Handy," "Reliable."
(See page 511.)

CROWN—See Bridgeport Brass Co.

CYCLONE—See Judd & Leland Mfg. Co.

EUREKA—See Judd & Leland Mfg. Co.

FOLLKIE—See American Carboneter Co.

GATLING—See Lake Erie Mfg. Co.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GOULDS Mfg. Co., Seneca Falls, N. Y.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANDY—See Cox Brass Mfg. Co.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HERCULES—See Sunderland Mfg. Co.

HILL—See Judd & Leland Mfg. Co.

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill. "Utility."

IDEAL—See Noera Mfg. Co.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. "Wixon."
(See page 329.)

JENSEN—See St. Charles Specialty Mfg. Co.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Eureka," "Columbia," "Tornado," "Cyclone," "Hill," "Victor."
(See pages 209 and 321.)

KELLOGG Mfg. Co., Rochester, N. Y.
(See page 527.)

KEYSTONE Novelty Co., Columbia, Pa. "Myers Aertite."

LAKE Erie Mfg. Co., 192-98 Chicago St., Buffalo, N. Y. "Gatling," "Minuteman," "Sentinel."
(See page 487.)

LITTLE GIANT—See Coe-Stapley Mfg. Co.

MAGIC—See Buffalo Auto Accessory Mfg. Co.

MARVEL—See St. Charles Specialty Mfg. Co.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill. "Skinner."

MINUTEMAN—See Lake Erie Mfg. Co.

MYERS AERTITE—See Keystone Novelty Co.

NOERA Mfg. Co., Waterbury, Conn. "Red Devil," "Ideal," "Waterbury."

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn. "Carver."
(See page 321.)

PEERLESS Accessories Manufacturers, 1926 S. Wabash Ave., Chicago, Ill.

PITNER—See Sunderland Mfg. Co.

RED DEVIL—See Noera Mfg. Co.

RELIABLE—See Cox Brass Mfg. Co.

REX—See Coe-Stapley Mfg. Co.

ST. CHARLES Specialty Mfg. Co., St. Charles, Ill. "Marvel," "Jensen."

SENTINEL—See Lake Erie Mfg. Co.

SHAWVER Co., rear 31 W. Pleasant St., Springfield, O. "Springfield."

SKINNER—See Mayo Mfg. Co.

SPRINGFIELD—See Central Brass & Fixture Co.

SPRINGFIELD—See Shawver Co.

STAPLEY—See Bridgeport Brass Co.

STAR Brass Works, 1909-11 Fulton St., Chicago, Ill. "Binks."

STEVENS Mfg. & Supply Co., Fischer Bldg., Chicago, Ill.

STOCKER Mfg. Co., 61 Fort St., E., Detroit, Mich.

SUNDERLAND Mfg. Co., 61 E. 24th St., Chicago, Ill. "Hercules," "Thor," "Pitner."

THOR—See Sunderland Mfg. Co.

TORNADO—See Judd & Leland Mfg. Co.

TURNER Brass Works, Sycamore, Ill.

UTILITY—See Hill Pump Valve Co.

VICTOR—See Judd & Leland Mfg. Co.

WATERBURY—See Noera Mfg. Co.

WINDJAMMER—See Bridgeport Brass Co.

WIXON—See Imperial Brass Mfg. Co.

ZENITH—See Buffalo Auto Accessory Mfg. Co.

OIL PUMPS

(See Lubricators)

STEAM AIR PUMPS

AMERICAN Steam Pump Co., Battle Creek, Mich. "Marsh."

MARSH—See American Steam Pump Co.

UNION Steam Pump Co., Battle Creek, Mich.

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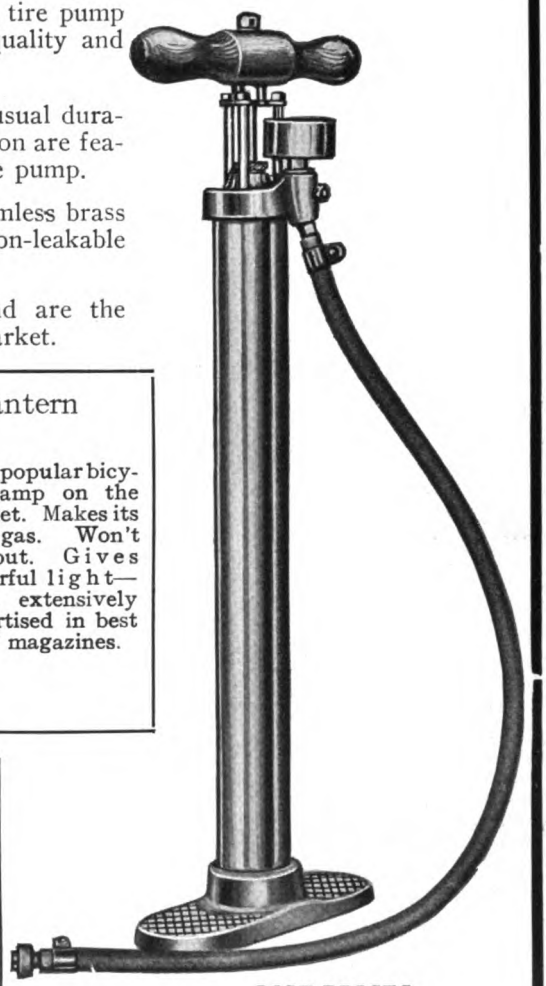
Tire Pumps and "Search-Light" Bicycle Lantern

The name **"Bridgeport"** on a tire pump is a guarantee of the highest quality and finest workmanship.

Simplicity of construction, unusual durability and air-tight pump connection are features of every **"Bridgeport"** tire pump.

"Bridgeport" pumps have seamless brass barrels and cannot rust. Have non-leakable valves and heavy cast base.

They are well advertised and are the most popular pumps on the market.



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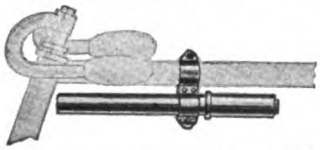
most popular bicycle lamp on the market. Makes its own gas. Won't jar out. Gives powerful light—also extensively advertised in best boys' magazines.

Bridgeport Bicycle Pumps



All classes of pumps for bicycles and motorcycles.

Write for list.

LIST PRICES
Without Gauge.....$4.00
With Gauge..... 6.00

BRIDGEPORT BRASS COMPANY
BRIDGEPORT, P. O. Station L. CONNECTICUT

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PUMPS (Continued)

STEAM BOILER FEED PUMPS

AMERICAN Steam Pump Co., Battle Creek, Mich. "Marsh."

MARSH—See American Steam Pump Co.

OFELDT & Sons, August. Valley Stream, N. Y.

UNION Steam Pump Co., Battle Creek, Mich.

WATER CIRCULATING PUMPS

ATLAS Brass Foundry Co., 980-90 S. Front St., Columbus, O.

BLACKMER Rotary Pump, Power & Mfg. Co., Petoskey, Mich.

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

DOEHLER Die-Casting Co., Court & Ninth Sts., Brooklyn, N. Y.
(See page 107.)

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

KINNEY Mfg. Co., 100 Boylston St., Boston, Mass.

LEE Co., Wm. O., Port Huron, Mich.
(See page 111.)

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.

LOBEE Pump & Machinery Co., 111-19 Dearborn St., Buffalo, N. Y.

OBERDORFER Brass Co., M. L., 804 E. Water St., Syracuse, N. Y.

OTTUMWA-MOLINE Engine & Pump Co., Ottumwa, Ia.

SPARKS-WITHINGTON Co., Jackson, Mich.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

PURIFIERS

ACETYLENE GAS PURIFIERS

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 229.)

TINKMAN Mfg. Co., Pierce City, Mo.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

PUSHES

FOOT PUSHES

(For ringing electric bells)

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y.

ROUSSEAU, David, Ossining, N. Y.

PUTTY

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

ALLENTOWN Mfg. Co., 26 S. Sixth St., Allentown, Pa.

BAKER, Wm. T., 220-32 Suydam Ave., Jersey City, N. J. "Reliable."

BELKNAP, McSherry & Moran Co., E. S., 5 Ainslie St., Brooklyn, N. Y.

BRIGGS & Co., John, 45 Purchase St., Boston, Mass.

CHICAGO White Lead & Oil Co., 1454 S. Western Ave., Chicago, Ill.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

DICKS-PONTIUS Co., 28 N. Canal St., Dayton, O.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

LUCAS & Co., John, 322-39 Race St., Philadelphia, Pa.

RELIABLE—See Baker, Wm. T.

WILHELM Co., A., Third & Bern Sts., Reading, Pa.

RACES

BALL RACES

(See Cups, Ball)

RACKS

HAT RACKS

(See also Hangers, Hat)

BRIDGEPORT Coach Lace Co., 1731-37 Broadway, New York, N. Y.
(See page 351.)

COLUMBIA—See Horstmann Co.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia."

SCHLEGEL Mfg. Co., College Ave. & N. Goodman St., Rochester, N. Y.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

TRUNK RACKS

CONNECTICUT Steel & Wire Co., 57-61 Allyn St., Hartford, Conn. "Standard."

CRANMER, Harry C., 223 S. 24th St., Philadelphia, Pa.

HIGHTON & Sons Co., Wm., Nashua, N. H.

MASCO—See Milwaukee Auto Specialty Co.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco."
(See page 445.)

NOONAN Tool & Machine Works, 130-36 St. James St., Rome, N. Y.

REED Co., 390 Main St., Mayfield, Cal.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

Complete Index to Classification appears on Pages 8 to 26.

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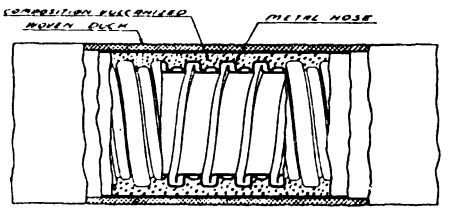

"Triplexd" Hose for Gasoline

"Triplexd" is a specially reinforced and very flexible metal hose.

"Triplexd" is as flexible as rubber hose and is stronger and more lasting than plain metal hose. In other words it possesses all the good qualities of both rubber and metal hose and at the same time eliminates the several faults to be found in their use.

Complete description together with prices will be sent upon request.

"Triplexd" is the hose you can afford to use.

Manufactured by

METAL HOSE & TUBING CO.
17 BATTERY PLACE,
NEW YORK

THE CARVER COMPOUND DOUBLE-ACTING PUMP

Compound and Double-Acting

Will inflate a tire to working pressure with less effort than any pump made.

Price $7.50

Write for Descriptive matter.

The Osborne & Stephenson Mfg. Co.
West Main St., Plainville, Conn.

IF YOU USE

SMALL PARTS

IN LARGE QUANTITIES, WRITE

Parker White Metal & Machine Co.
Erie, Pa.

The VICTOR a HALF a MINUTE PUMP

VICTOR

Trade Mark Reg.

WILL INFLATE a TIRE in ONE-THIRD THE number of STROKES of any Competitive Pump.

Its METALLIC TANNED PACKINGS will wear forever and are guaranteed.

REMEMBER

No Pump is *STRONGER* than its *PACKINGS.*

Judd & Leland Mfg. Co.
Clifton Springs, N. Y.

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RACKS (Continued)

TRUNK RACKS (Continued)

SMITH, H. Lund, 199-203 Paterson St., Paterson, N. J.

STANDARD—See Connecticut Steel & Wire Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

RADIATORS

WATER COOLERS OR RADIATORS

A-Z Co., 530 W. 56th St., New York, N. Y.

BRISCOE Mfg. Co., Detroit, Mich.

BUSH Mfg. Co., Hartford, Conn.
(See page 363.)

CANDLER Radiator Co., Detroit, Mich.
(See page 327.)

DETROIT Radiator & Specialty Co., 663 Woodward Ave., Detroit, Mich.

DIPPERT—See Motor Radiator Co.

EL ARCO Radiator Co., West End Ave. & 64th St., New York, N. Y.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

EUREKA Auto Parts Mfg. Co., 1915 Pine St., St. Louis, Mo.

FEDDERS Mfg. Co., Buffalo, N. Y.
(See pages 324 and 325.)

GOETZ Co., 1802 Clybourn Ave., Chicago, Ill.

HARRISON Mfg. Co., Lockport, N. Y.
(See page 521.)

HOLIHAN Mfg. Co., 21st & Jefferson Sts., Detroit, Mich.

IDEAL Sheet Metal Works, 2809 Michigan Ave., Chicago, Ill.
(See page 327.)

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y.
(See page 199.)

KINSEY Mfg. Co., Toledo, O. "Kinwood."

KINWOOD—See Kinsey Mfg. Co.

KURTZNER Radiator Co., 2225 Ashland Rd., Cleveland, O.

LIVINGSTON Radiator & Mfg. Co., 75th St. & Amsterdam Ave., New York, N. Y.
(See page 327.)

LONG Mfg Co., Detroit, Mich.
(See page 323.)

McCORD Mfg. Co., Detroit, Mich.
(See pages 176 and 177.)

MAYO Radiator Co., New Haven, Conn.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MOTOR Radiator Co., Mutual Life Bldg., Buffalo, N. Y. "Dippert."

NATIONAL Can Co., Detroit, Mich.

NATIONAL Radiator Co., 846 S. Canal St., Chicago, Ill.

PERFEX Radiator Co., Racine, Wis.

ROME-TURNEY Radiator Co., Rome, N. Y.

TAKE-APART-RADIATOR Co., 804 E. Washington St., Greensburg, Ind. "T-A-R-Co."

T-A-R-CO—See Take-Apart-Radiator Co.

TODD Mfg. Co., 820-24 Mary Pl., Minneapolis, Minn.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

RAILS

ROBE OR COAT RAILS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALLEN Fire Department Supply Co., Providence, R. I.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMERICAN Ring Co., 531 Bank St., Waterbury, Conn.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

AUTO Specialty Co., 89 Pearl St., Boston, Mass.

B. G. & M. Mfg. Co., 548 N. Franklin St., Chicago, Ill.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

COWLES & Co., C., New Haven, Conn.
(See page 463.)

COX Brass Mfg. Co., Albany, N. Y.
(See page 511.)

DETLAFF, A. J., 121 Champlain St., Detroit, Mich.

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 205.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

F & K—See Findeisen & Kropf Mfg. Co.

FINDEISEN & Kropf Mfg. Co. 2125 Rockwell St., Chicago, Ill. "F & K," "Fit-all."
(See page 95.)

FIT-ALL—See Findeisen & Kropf Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Milwaukee."
(See page 87.)

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O.

MEDINA Stamping & Machine Co., Medina, N. Y.

METAL Stamping Co., 13th St., & Boulevard, Long Island City, N. Y.

MILWAUKEE—See Garage Equipment Mfg. Co.

MURDOCK, Jr. Co., Jas., 116 Opera Pl., Cincinnati, O.

NEW YORK Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y.

Complete Index to Classification appears on Pages 8 to 26.

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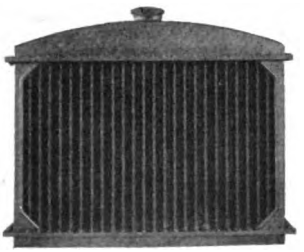
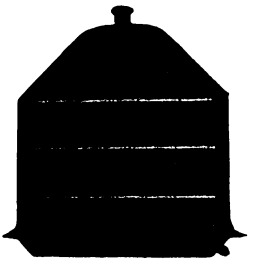


Properly Cooled Motors Are Most Efficient



The Heads of More than Seventy Motor Car Factories Recognize the Supreme Superiority of

LONG

Cooling Systems

Long Cooling Systems are today a part of the *regular* equipment of more than seventy makes of motor cars and trucks. They are correct in design, workmanship and material. The radiating qualities of Long Cooling Systems make them the *logical* selection where high class motors are used.

Guaranteed to Be Perfectly Free from Imperfection in Design, Material and Workmanship

Extra quality of material—extra care in making—extra precautions in testing, *assure* extra efficiency. Sufficient radiation to keep motor cool at all times. Absolute assurance against the annoyance and loss occasioned so often by "under" or "over" radiation due to poorly designed "radiators."

Guaranteed to Cool Properly the Motors for Which They Are Built

Each Long Cooling System for each style of motor is an individual problem with us—*a problem that we solve.* Each system is designed to *fill* the individual requirements. Each radiator is thoroughly tested and inspected, washed with live steam and every precaution taken to stand the test of actual service.

Several types of Long Cooling Systems are made—Cellular, Flat Tube Honeycomb, Spiral Tube, Fin and Tube. Write for catalog. Or—if you wish, we will gladly send our Radiation Engineering Experts to confer with you relative to *your* radiation problem.

We are specialists in the designing and manufacturing of radiators.

LONG MFG. CO., Detroit, Mich.

Pioneer Makers of Gasoline Engine Cooling Systems

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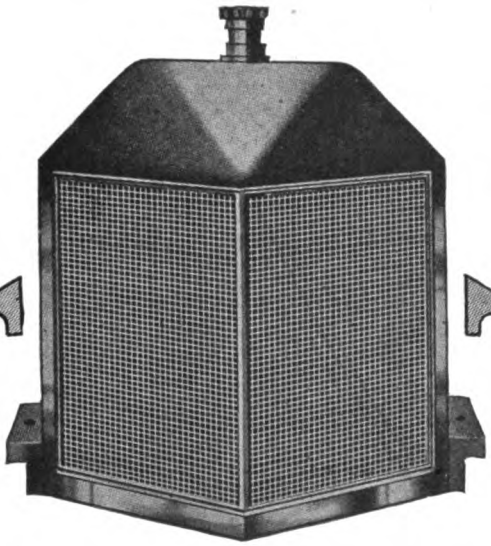
QUALITY



Style and efficiency can be given Ford Cars if you replace the old style with a Fedders V Type Radiator.

FED RAD

Ford owners in all parts of the country are equipping their cars with Fedders V Type Radiators.

This radiator goes further than improve the appearance of Ford cars—it improves the engine efficiency to a degree that is highly satisfactory.

The price, $42.00, and the ease with which the Fedders V Type Radiator can be put on makes an altogether agreeable proposition for every Ford owner.

Dealers—Write for particulars regarding discounts and get our installation instructions.

The New Fedders V Type Radiator for Ford Cars is made of the same materials, and with the same skill that is employed in the making of regular Fedders Quality Radiators.

Fedders Manufacturing Co., Inc.

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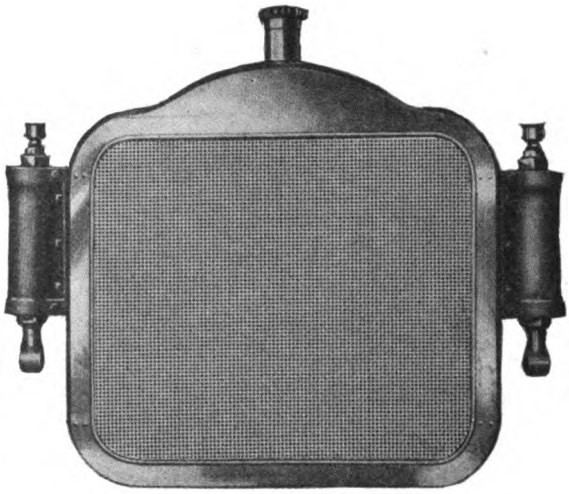
RADIATORS

Fedders Quality and Strength are worthy of your consideration if better service means anything to your car.



ERS
TORS

In almost any other part of an automobile Quality could be sacrificed with less injury to the service of the car.

Fedders Radiators have enjoyed the uninterrupted patronage of many of the more prominent automobile manufacturers for years because very early in the history of the automobile industry the quality of their service won them an enviable reputation, a reputation for efficient performance which they never have relinquished or compromised.

Wherever Fedders Standard Design will serve we recommend its adoption, but in cases where some special design is required, our facilities enable us to handle such orders economically and promptly.

Booklet on request.

Buffalo - - - New York

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RAILS (Continued)

ROBE OR COAT RAILS (Continued)

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

SMITH, H. Lund, 199-203 Paterson St., Paterson, N. J.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STERLING—See Auto Accessories Mfg. Co.

TURNER Brass Works, Sycamore, Ill.

UNITED States Metal Products Co., 111 Broadway, New York, N. Y.
(See page 83.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WHITEHOUSE LeCompte Mfg. Co., 42-54 Elm St,. Newark, N. J.
(See page 509.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W.. Mount Carmel, Conn.

RECORDERS

VEHICLE MOVEMENT RECORDERS

(For recording time vehicle is used)

AMERICAN Taximeter Co., 735-37 Seventh Ave., New York, N. Y. "Recordograf."

BROWN, W. H., Rose Bldg., Cleveland, O. "Trafilog."

CORONET Mfg. Co., 10308 Euclid Ave., Cleveland, O.

JONES Speedometer Co., Bush Terminal, Brooklyn, N. Y.

KNOPF Bros. Mfg. Co., 2071 Seventh Ave., New York, N. Y.

RECORDING Speedometer Co., Academy St., Newark, N. J. "Speedograph."

RECORDOGRAF—See American Taximeter Co.

SEARS-CROSS Co., 19-21 W. 62d St., New York, N. Y.
(See page 365.)

SERVICE Recorder Co., 2344 E. 105th St., Cleveland, O. "Servis."

SERVIS—See Service Recorder Co.

SPEEDOGRAPH—See Recording Speedometer Co.

TRAFILOG—See Brown, W. H.

UNIQUE Recorder Co., Glover Bldg., Hazleton, Pa.

RECTIFIERS

ALTERNATING CURRENT RECTIFIERS

AMERICAN Battery Co., 1132-34 Fulton St., Chicago, Ill.

ASHBROOK, J. F., 2639 Emmet St., Chicago, Ill. "Johns."

ECONOMY—See Electric Economy Co.

EDISON, Thomas A., 114 Lakeside Ave., Orange, N. J.

ELECTRIC Economy Co., Hyde Park, Mass. "Economy."

ELECTRIC Products Co., Cleveland, O. "Wotton."

ELECTRIC Storage Battery & Mfg. Co., Cincinnati, O.

ELLINGTON Electric Co., Quincy, Ill.

GENERAL Electric Co., Schenectady, N. Y.

HICKLEY, Thomas, Belmar, N. J.

JOHNS—See Ashbrook, J. F.

MURPHY Electricity Rectifier Co., 187 N Water St., Rochester, N. Y.

PEQUOZ Electric Co., Cleveland, O.

ST. LOUIS Electrical Works, St. Louis, Mo

SERVICE Battery Co., 2325-27 Wabash Ave.. Chicago, Ill.

SIMPLICITY—See Wilson Supply Co.

SIRCH Electrical & Testing Laboratories, 126 W. Third St., Los Angeles, Cal.

STANDARD Metal Mfg. Co., Newark, N. J.
(See page 213.)

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

WILSON Supply Co., 1191 Gladys Ave., Cleveland O. "Simplicity."

WOTTON—See Electric Products Co.

REEDS

HORN REEDS

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y.

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St.. Newark, N. J.

STANDARD Metal Mfg. Co., Newark, N. J.
(See page 213.)

REFLECTORS

MIRROR LAMP REFLECTORS

BACHE & Co., Semon, West & Hubert Sts., New York, N. Y.

BAUSCH & Lomb Optical Co., Rochester, N. Y.

FRY Glass Co., H. C., Rochester, Pa.

JEFFERSON Glass Co., Follansbee, W. Va.

LANCASTER Lens Co., Lancaster, O.

MACBETH-EVANS Glass Co., Wabash Terminal Bldg., Pittsburg, Pa.

MATISSE, C. & A., 543-49 E. 116th St., New York, N. Y.

NATIONAL Reflector Co., Clarksburg, W. Va.

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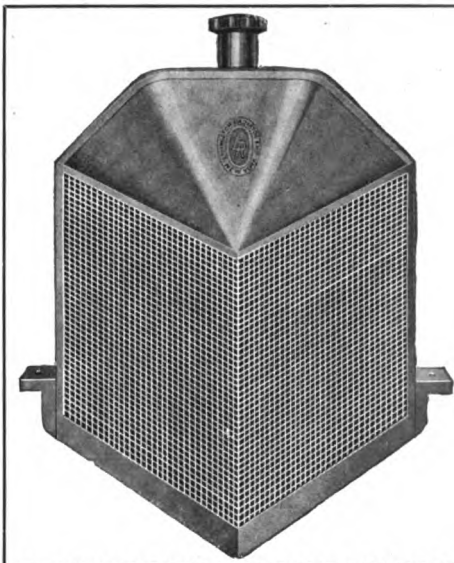
Ideal Guaranteed Radiators

A Model for Every Type of Car

Ideal Radiators differ in construction from every other radiator made. Their construction is exclusively our own, held under our own patents. Ideal Radiators have freer water circulation—more air space and cooling surface between water channels—and they hold a gallon more water than the average radiator. Crystallization is impossible with an Ideal Radiator. No boiling in summer, no freezing in winter.

We are equipped to handle radiator repair work at lightning speed. We receive and ship from coast to coast. We are able to repair and ship radiator same day it is received.

Ideal Sheet Metal Works
2809 Michigan Ave. Chicago



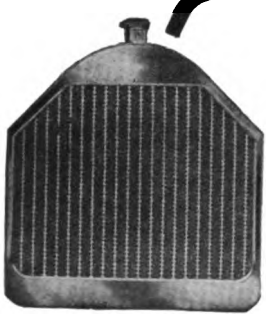
LIVINGSTON RADIATORS

are the most efficient radiators made. Light and strong, they possess the greatest possible cooling ability, with every drop of water in direct contact with the radiating surfaces at all times.

All types of Radiators built, rebuilt and repaired.

We build individual radiators for car owners.

LIVINGSTON RADIATOR & MFG. CO.
N. W. Cor. 75th St. and Amsterdam Ave., New York



STRENGTH, BEAUTY & EFFICIENCY
PREDOMINATE IN

CANDLER RADIATORS

They are made in a factory devoted entirely to radiators and specializing in gasoline motor cooling.

Modern manufacture, thorough supervision of work and a low overhead expense, mean that our customers are securing a better radiator at a lower price.

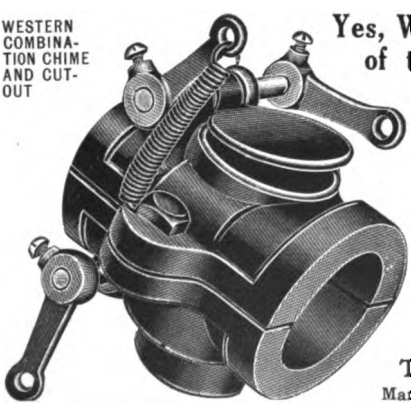
Our deliveries are absolutely dependable, workmanship guaranteed, and our factory is not allowed to become over-loaded.

A special department is maintained for rebuilding and repairing all makes of radiators.

Candler Radiators give constant service.

CANDLER RADIATOR COMPANY, DETROIT, MICH.

WESTERN COMBINATION CHIME AND CUT-OUT



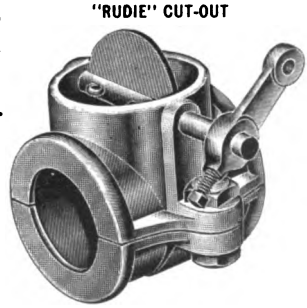
Yes, We Are the Makers of the "Husk" Chime and Valves

Also a full line of Standard Accessories

OUR SPECIALTY
Special Parts for Season Requirements.

TRY US.

"RUDIE" CUT-OUT



THE WESTERN BRASS MFG. WORKS
Marshall Boulevard, 21st Street and C., B. & Q. R.R., CHICAGO, ILL.

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REGULATORS

ACETYLENE PRESSURE OR REDUCING VALVE REGULATORS

(For use with acetylene lamps or starters: See also Controllers, Acetylene Lamps)

AUTO Lamp & Metal Works, 1906 Broadway, New York, N. Y. "L. & H."

CRUM-WILEY Mfg. Co., Peru, Ind.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

JERICHO—See Randall-Faichney Co.

L. & H.—See Auto Lamp & Metal Works.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.
(See page 509.)

RANDALL-FAICHNEY Co., Boston, Mass. "Jericho."

FUEL FEED REGULATORS

OFELDT & Sons, F. W., Nyack, N. Y.

TANK PRESSURE REGULATORS

(For regulating the exhaust pressure on gasoline or oil tanks)

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

LOCKE Regular Co., 76 North St., Salem, Mass.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

WATER LEVEL REGULATORS

OFELDT & Sons, F. W., Nyack, N. Y.

WINDOW REGULATORS

COWLES & Co., C., New Haven, Conn. "Fisher."
(See page 463.)

FISHER—See Cowles & Co.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

PERFECT Window Regulator Co., 43 Exchange Pl., New York, N. Y.

REMOVERS

CARBON REMOVERS

(See also Compounds, Carbon Removing; also Scrapers Carbon; also Machines, Motor Decarbonizing)

MASCO—See Milwaukee Auto Specialty Co.

MICHENER, E. S., 30 Washington St., New Castle, Pa.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco."
(See page 445.)

PAINT AND VARNISH REMOVERS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

AD-EL-ITE—See Adams & Elting Co.

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill. "Ad-el-ite."

ALBANY Chemical Co., 22 Bradway, Albany, N. Y.

BERRY Bros., Detroit, Mich.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston Mass. "Premium."

BRADLEY & Vrooman Co., Chicago, Ill. "Crown."

BRIDGEPORT Wood Finishing Co., New Milford, Conn.

CALLERY & Co., W. W., 188 36th St., Pittsburg, Pa.

CHALMERS Chemical Co., 218 McWhorter St., Newark, N. J. "Phenoid."

CROWN—See Bradley & Vrooman Co.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich. "Rogers Abluent."

EBERSON Paint Co., 18th & Pine Sts., St. Louis, Mo. "V. & P."

ECLIPSE—See Gould & Cutler.

ENTERPRISE Paint Mfg. Co., Peoria & Van Buren Sts., Chicago, Ill. "Noxall."

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

GILLESPIE & Son, Chas. H., 19 Dey St., Jersey City, N. J. "Monarch Bull Dog."

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

GOULD & Cutler, 45 Sudbury St., Boston, Mass. "Eclipse."

IDOL-YUSSO—See Schlegel Mfg. Co.

JEWEL—See Wadsworth-Howland Co.

KLEAN-ITT—See Lawrence & Co.

KLENSA—See Standard Varnish Works.

KUT-KOTE—See Thurston Co.

LAWRENCE & Co., W. W., Pittsburg, Pa. "Klean-itt."

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa. "Mirac."

MIRAC—See Lucas & Co.

MONARCH Bull Dog—See Gillespie & Son.

NOXALL—See Enterprise Paint Mfg. Co.

PARROTT Varnish Co., 453 N. Washington Ave., Bridgeport, Conn.

PENINSULAR Paint & Varnish Co., Detroit, Mich.

PHENOID—See Chalmers Chemical Co.

PREMIUM—See Blue Ribbon Co.

ROGERS ABLUENT—See Detroit White Lead Works.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y. "Idol-Yusso."

STANDARD Varnish Works, (Elm Park), Port Richmond, N. Y. "Klensa."

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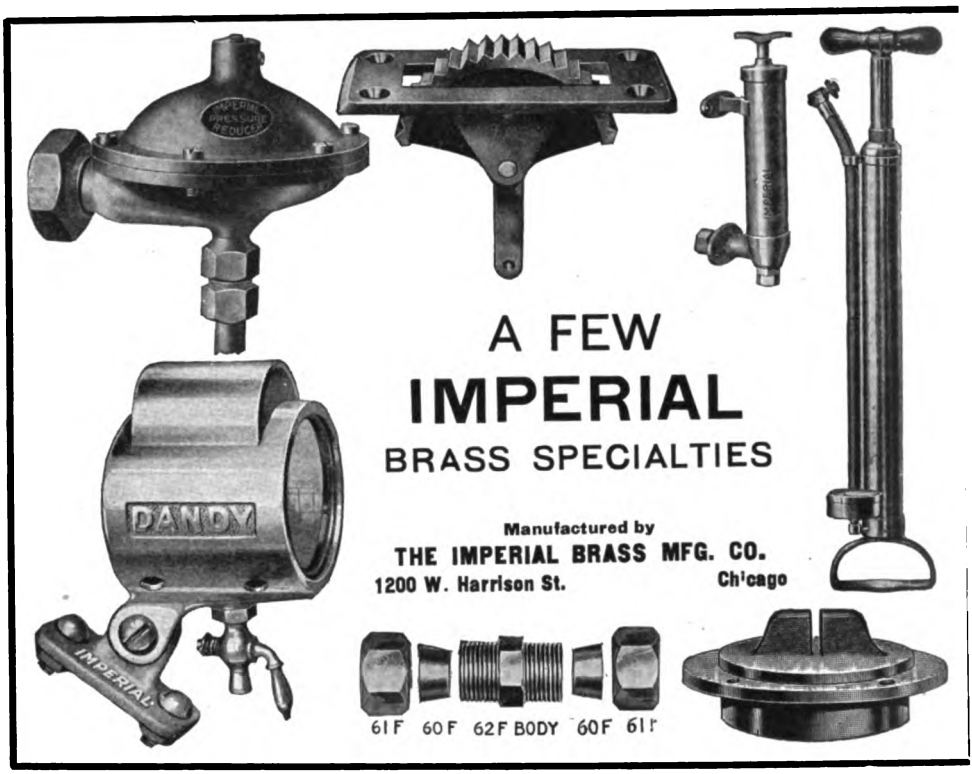

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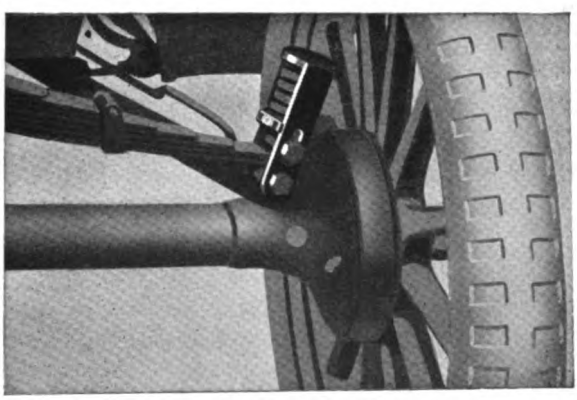

has as little right to place in this space as high prices have to be paired with shock absorbers for your Ford car. But the one is a real word and the other a no less real fact.

WHY PAY 15, 20, or 25 Dollars for shock absorbers for your Ford? WHY PAY even $10.00 for any other device than the Wallace Shock Absorber when that $10.00 will buy the most efficient shock absorber on the market regardless of price.

To the FORD OWNER who buys the WALLACE we guarantee COMFORT and SATISFACTION and an actual saving on WEAR and TEAR, TIRES, TISSUE and TEMPER.

To the WIDE AWAKE DEALER we offer the year's best seller in accessory lines on terms that DEMAND consideration. Write for discounts.

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Order through your dealer or direct

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DETROIT, MICH.

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REMOVERS (Continued)

PAINT AND VARNISH REMOVERS (Continued)

THURSTON, Co., F. W., 1832-34 S. Clark St., Chicago, Ill. "Kut-Kote."

V. & P.—See Eberson Paint Co.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WILSON Remover Co., 115 Chestnut St., Newark, N. J. "Wonderpaste."

WONDERPASTE—See Wilson Remover Co.

REPAIRERS

SPRING REPAIRERS

(See Clamps, Spring Repair)

RESTS

BOW RESTS

(See also Holders, Top; also Separators, Bow

AMERICAN Brass Novelty Co., Grand Haven, Mich.

ANCHOR—See North & Judd Mfg. Co.

BARBEE Mfg. Co., 1401-05 W. Ninth St. Cleveland, O.

CAMPBELL—See Perkins-Campbell Co.

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 365.)

DESOCO—See Detroit Socket Co.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

HOOVER Co., W. H., New Berlin, O.

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NORTH & Judd Mfg. Co., New Britain, Conn. "Anchor."

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell."
(See page 48.)

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

FOOT RESTS

(See also Hassocks)

A-Z Co., 530 W. 56th St., New York, N. Y.

AETNA Brass Mfg. Co., 3870-90 Hamilton Ave., Cleveland, O.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALLEN Fire Department Supply Co., Providence, R. I.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

AUTO Specialty Co., 89 Pearl St., Boston, Mass.

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

COWLES & Co., C., New Haven, Conn.
(See page 463.)

COX Brass Mfg. Co., Albany, N. Y.
(See page 511.)

DETLAFF, A. J., 121 Champlain St., Detroit, Mich. "Rest E-Z."

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 205.)

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

F & K—See Findeisen & Kropf Mfg. Co.

FINDEISEN & Kropf Mfg. Co., 2125 Rockwell St., Chicago, Ill. "K & K."
(See page 95.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O.

MEDINA Stamping & Machine Co., Medina, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

REST E-Z—See Detlaff, A. J.

SARGENT Mfg. Co., New & Summit Sts., Newark, N. J.

SMITH, H. Lund, 199-203 Paterson St., Paterson, N. J.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TURNER Brass Works, Sycamore, Ill.

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THE "STAR" ANTI-FRICTION RADIAL AND THRUST "BALL RETAINERS"

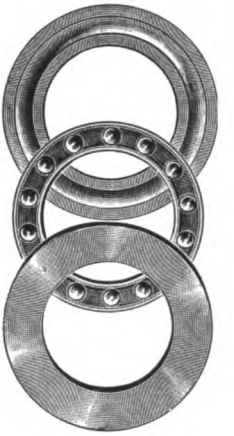
FOR USE IN
HUBS,
STEERING
GEARS,
CLUTCHES,
TRANSMISSIONS,
THRUSTS ON
SHAFTS,
STEERING
KNUCKLES,
FANS,
MAGNETOS,
TIMERS, ETC.

"STAR"

Radial Ball Retainer for Cup and Cone Bearings.

Made in a shop devoted especially to this work by expert workmen and from the best of material.

Our deliveries are prompt. Let us make you quotations and send all details.



"STAR"

Ball Retainer for Thrust Bearings.

THE STAR BALL RETAINER CO.,
LANCASTER, PA.

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RESTS (Continued)

FOOT RESTS (Continued)

UNITED States Metal Products Co., 111 Broadway, New York, N. Y.
(See page 83.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WHITEHOUSE LECOMPTE Mfg. Co., 42-54 Elm St., Newark, N. J.
(See page 509)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

HEEL RESTS

AUTO Pedal Pad Co., 794 Seventh Ave., New York, N. Y.

FUQUA Bros., 2418 W. Main St., Richmond, Va.

LUCAS & Son, J. L., 3 Fox St., Bridgeport, Conn.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

RETAINERS

BALL RETAINERS

BOSSERT Co., Utica, N. Y.
(See page 217.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

OAKES Pressed Steel Co., Indianapolis, Ind.

STAR Ball Retainer Co., Lancaster, Pa.
(See page 331.)

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

RHEOSTATS

BATTERY CHARGING RHEOSTATS

ALLEN-BRADLEY Co., 495-97 Clinton St., Milwaukee, Wis.

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis.
(See page 185.)

ELECTRIC Products Co., Cleveland, O.

GENERAL Electric Co., Schenectady, N. Y.

LEONARD Electric Co., Ward, Bronxville, N. Y.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

RIMS

QUICK DETACHABLE RIMS

CLEVELAND Welding & Mfg. Co., 8205 Franklin Ave., N. W., Cleveland, O.

KELSEY Wheel Co., Detroit, Mich.

MOTT Wheel Works, Utica, N. Y.
(See page 359.)

STANDARD Welding Co., Cleveland, O. "Stanweld."
(See Book Mark.)

STANWELD—See Standard Welding Co.

WESTON-MOTT Co., Flint, Mich.
(See page 51.)

REMOVABLE OR DEMOUNTABLE RIMS

ANGLADA Co., Free Press Bldg., Detroit, Mich.

ASHLEY-MOYER—See General Rim Co.

BAKER—See Universal Rim Co.

CHESTER Demountable Rim Co., Fall River, Mass.
(See page 391.)

DETROIT—See Jackson Rim Co.

DETROIT Demountable Rim Co., 1330 12th Ave., Detroit, Mich.

E-Z Rim Co., 98 Massachusetts Ave., Boston, Mass.

FIRESTONE Tire & Rubber Co., Akron, O.

FISK Rubber Co., Chicopee Falls, Mass.

FUNK—See Mott Wheel Works.

GENERAL Rim Co., Swetland Bldg., Cleveland, O. "Ashley-Moyer."

HOWARD Demountable Rim Co., 1850 E. State St., Trenton, N. J.

JACKSON Rim Co., Jackson, Mich. "Detroit."
(See page 333.)

KELSEY Wheel Co., Detroit, Mich.

MICHELIN Tire Co., Milltown, N. J.

MOTE Demountable & Detachable Rim Co., Wayne County Bank Bldg., Detroit, Mich.

MOTT Wheel Works, Utica, N. Y. "Funk."
(See page 359.)

NEWMASTIC Co., 151 W. 68th St., New York, N. Y.

PRESTO Inter-Rim Co., 883 Boylston St., Boston, Mass.
(See page 337.)

SPRANGER Rim & Wheel Co., Ford Bldg., Detroit, Mich.

STANDARD Welding Co., Cleveland, O. "Stanweld."
(See Book Mark.)

STANWELD—See Standard Welding Co.

UNITED States Tire Co. Broadway & 58th St., New York, N. Y.

UNIVERSAL Rim Co., 1301 Michigan Ave., Chicago, Ill. "Baker."

WESTON-MOTT Co., Flint, Mich.
(See page 51.)

RUBBER STEERING WHEEL RIMS

CONDENSITE Co. of America, Belleville Ave., Glen Ridge, N. J.

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The Rim That is Conclusively Mechanical

THE arrow and "V" block construction makes the Detroit Rim absolutely positive, and is the only demountable rim having this unique feature.

The cut out section of the Detroit Rim allows such freedom of operation in removing the tire that a pair of ordinary hands are the only tools—in extreme cases a small screw driver is the all that is necessary.

We claim for the Detroit rim, strength, lightness, quality, economy and durability, a rim any novice can operate without the assistance of the "nearest garage."

We respectfully request the Builders of Motor Cars to extend the opportunity of proving the worth of the above claims. Our prices are as interesting as our rims.

JACKSON RIM COMPANY

JACKSON, MICHIGAN

Exclusive Manufacturers of the Detroit Demountable Rim

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RIMS (Continued)

RUBBER STEERING WHEEL RIMS (Continued)

DIAMOND RUBBER CO., Akron, O.

GENERAL Insulate Co., 1008-14 Atlantic Ave., Brooklyn, N. Y.

LUZERNE Rubber Co., Trenton, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

STANDARD RIMS

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

CLEVELAND Welding & Mfg. Co., 8205 Franklin Ave., N. W., Cleveland, O.

KELSEY Wheel Co., Detroit, Mich.

MOTT Wheel Works, Utica, N. Y. (See page 359.)

STANDARD Welding Co., Cleveland, O. "Stanweld." (See Book Mark.)

STANWELD—See Standard Welding Co.

WESTON-MOTT Co., Flint, Mich. (See page 51.)

WOOD RIMS OR FELLOES

BREECE Mfg. Co., Portsmouth, O.

CAMPBELL & Dann Mfg. Co., Tullahoma, Tenn.

CRANE & MacMahon, 8-10 Bridge St., New York, N. Y. "Nut." "Star."

EBERLY & Orris Mfg. Co., Mechanicsburg, Pa.

HARTWELL & Co., C. L., Chicago Heights, Ill.

JONES & Co., Phineas, Newark, N. J. (See page 525.)

KOLLER & Co., J. B., Mechanicsburg, Pa.

LEBZELTER & Son Co., Philip, 241 N. Queen St., Lancaster, Pa.

NUT—See Crane & MacMahon.

SKINNER Bending Co., J. M., Toledo, O.

STAR—See Crane & MacMahon.

TOLEDO Bending Co., Toledo, O.

TUCKER Woodwork Co., Sidney, O.

YORK Bending Works, 402 N. Queen St., York, Pa.

WOOD STEERING WHEEL RIMS

AMERICAN Wood Rim Co., Onaway, Mich.

AUTO City Bow Co., 441-47 Livernois Ave., Detroit, Mich. (See page 521.)

DETROIT Auto Dash Co., 519-21 Beaubien St., Detroit, Mich. (See page 151.)

TUCKER Woodwork Co., Sidney, O.

RINGS

DUST RINGS

(See Washers, Felt)

PISTON RINGS

AMERICAN Piston Ring Co., 314-73 Jelliff Ave., Newark, N. J.

AUTOMOBILE Construction & Engineering Co., 3224 Ludlow St., Philadelphia, Pa. "Perfection." (See page 335.)

BURD High Compression Ring Co., 814-18 S. Main St., Rockford, Ill. (See page 459.)

DETROIT Piston Ring Co., 14 Sherman St., Detroit, Mich. "Gaslok."

DUNHAM, M. L., 140 W. 52d St., New York, N. Y. "Duplex."

DUPLEX—See Dunham, M. L.

ECO Mfg. Co., 53 State St., Boston, Mass. (See page 335.)

END-OXY Appliance Co., Trenton, N. J. "Leektite."

EVER Tight Piston Ring Co., 1424-26 Chestnut St., St. Louis, Mo.

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.

GASLOK—See Detroit Piston Ring Co.

HEBERT Mfg. Co., Franklin, N. H.

HORAT, J., Dept. H, Lafayette, Ind. "Tight-Wad." (See page 521.)

LAKE Sales Co., 1947 Broadway, New York, N. Y. "Wasson." (See page 349.)

LEAK-PROOF—See McQuay-Norris Mfg. Co.

LEEKTITE—See End-Oxy Appliance Co.

McCADDEN Machine Works, St. Cloud, Minn.

McQUAY-NORRIS Mfg. Co., 2808-10 Locust St., St. Louis, Mo. "Leak-Proof."

MERRITT Co., S. Whyle, 311 W. 59th St., New York, N. Y.

MICRO Piston Ring Co., 1960 Broadway, New York, N. Y.

PERFECTION—See Automobile Construction & Engineering Co.

PERFECTION Piston Ring Co., 149 West St., Gardner, Mass.

PISTON Ring Co., Muskegon, Mich. "Sta-Tite," "Quality."

QUALITY—See Piston Ring Co.

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 289.)

STA-TITE—See Piston Ring Co.

STA-TITE Packing Ring Co., 3049 Olive St., St. Louis, Mo.

TEETER-HARTLEY Motor Co., Hagerstown, Ind.

TIGHT-WAD—See Horat, J.

WAINWRIGHT & Son, W. W., Connersville, Ind. (See page 291.)

WASSON—See Lake Sales Co.

RIVETS

BRASS AND COPPER RIVETS

BLAKE & Johnson Co., Waterbury, Conn.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. "Crown." (See page 319.)

COBB & Drew, Plymouth, Mass.

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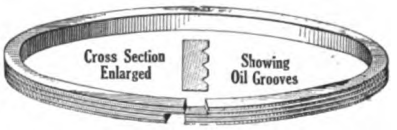
OIL PACKING PISTON RING



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Oil Packing Self-Lubricating Piston Rings.

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More and continuous power,
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First Operation

PERFECTION PISTON RINGS

They are made of soft, elastic steel 1/16″ wide and put together in sets of four. They give compression and power to your motor unequalled by any other rings. They present a barrier to the gas in the combustion chamber such as cannot be possible with a one piece ring.

This construction gives perfect compression, maximum power, minimum carbon, smaller oil consumption, lower gasoline bills, less smoke and saving in repair bills. These rings are put on the pistons without being stretched, and this is impossible with one piece rings, which are always distorted when stretched over the pistons.

Last Operation

PERFECTION PISTON RINGS are made in all sizes and can be sold by dealers to great advantage. *Let us give you special quotations for your next year's requirements.*

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RIVETS (Continued)

BRASS AND COPPER RIVETS (Continued)

CROWN—See Bridgeport Brass Co.

FALLS Rivet Co., Kent, O.

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y.

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

PROGRESSIVE Mfg. Co., Torrington, Conn.

ROME Brass & Copper Co., Rome, N. Y.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

WATERBURY Brass Goods Corp., 160 Washington Ave., Waterbury, Conn.

WATERBURY Mfg. Co., Waterbury, Conn.

COPPER RIVETS

(See Rivets, Brass)

IRON AND STEEL RIVETS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

AMERICAN Screw Co., Providence, R. I.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

COBB & Drew, Plymouth, Mass.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

FALLS Rivet Co., Kent, O.

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

GRAND Crossing Tack Co. (Grand Crossing), Chicago, Ill.

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

MICHIGAN Bolt & Nut Works, ft. Meldrum Ave., Detroit, Mich.

NATIONAL Screw & Tack Co., Stanton Ave., & C. & P. Ry., Cleveland, O.

NEWARK Rivet Works, 262 Lafayette St., Newark, N. J.

PITTSBURG Screw & Bolt Co., Preble Ave. (N. S.), Pittsburg, Pa.

PLYMOUTH Mills, Plymouth, Mass.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

UPSON Nut Co., Unionville, Conn.

PLATINUM RIVETS

(See Platinum)

ROBES

AUTOMOBILE LAP ROBES

ADIRONDACK—See Spear-Martin Fur Co.

AMERICAN Buffalo Robe Co., 1-7 Howell St., Buffalo, N. Y.

AUTO-COMFORT Robe Co., Gloversville, N. Y.

AUTO Robe & Rubber Co., 13 E. 16th St., New York, N. Y.

AYRES & Sons, Wm., Cumberland & Third Sts., Philadelphia, Pa.

BALLARD & Co., J. O., Malone, N. Y.

BECKMAN Co., 3167 Fulton Rd., Cleveland, O.

BISHOP Co., J. H., Wyandotte, Mich.

BURLINGTON Blanket Co., Burlington, Wis. "Sho-Fur."

CHASE & Co., L. C., Boston, Mass. (See page 123.)

CHICAGO Auto Robe Supply Co., 12-16 S. Market St., Chicago, Ill. "Perfection."

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

CURTIS & Von Bernuth Mfg. Co., 88 W. Broadway, New York, N. Y.

DAVIS Robe & Armor Co., 8 N. State St., Chicago, Ill.

DAWSON, J. & E., Fairhill Station, Philadelphia, Pa. "Name-On."

DRAPER Bros. Co., Canton, Mass.

GAUSLER & Starr Co., 249 Market St., Philadelphia, Pa.

GORDON Co., J. P., 272 N. Fourth St., Columbus, O.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y. (See page 415.)

KOPF-ENGEL Co., 49 Warren St., New York, N. Y.

MOORE-SMITH Co., Winthrop Sq., Boston, Mass.

NAME-ON—See Dawson, J. & E.

NEW YORK Lap Robe Co., 219 Greene St., New York, N. Y.

NEW York Leather Coat Co., 33-35 Greene St., New York, N. Y.

PERFECTION—See Chicago Auto Robe Supply Co.

REVILLON Frères, 19 W. 34th St., New York, N. Y.

RILEY & Co., Wm. B., 238 Chestnut St., Philadelphia, Pa.

SHO-FUR—See Burlington Blanket Co.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

WALLACE Co., Hugh, 2626 E. Grand Boulevard, Detroit, Mich.

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill.

WINSHIP, W. W., 71 Summer St., Boston, Mass.

RODS

ADJUSTABLE VALVE LIFT RODS

APCO—See Auto Parts Co.

AUTO Parts Co., 702 Eddy St., Providence, R. I. "Apco."

BRIDGEPORT—See Lyford Bros.

LYFORD Bros., 625 Washington Ave., Bridgeport, Conn. "Bridgeport."

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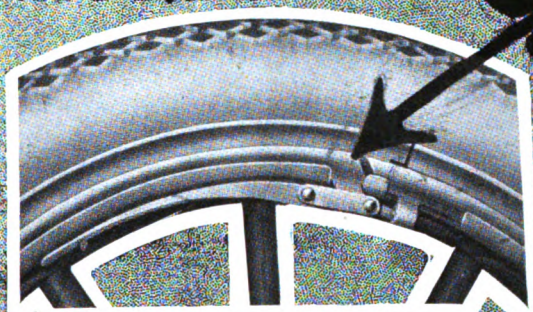
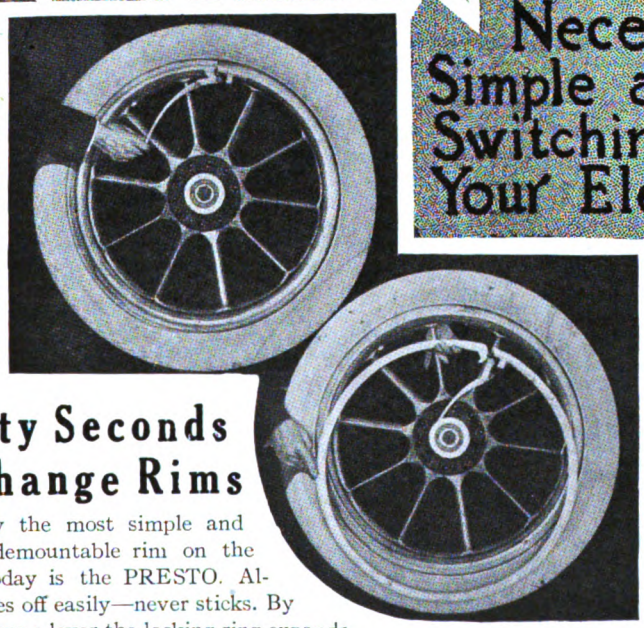
PRESTO DEMOUNTABLE RIMS

Pull Down *this* Lever *and the* Rim Comes Off!



Not a Bolt, Nut, Hammer or Wrench Necessary.

Simple as Switching on Your Electric Lights



A Special Rim for Ford Cars at a Special Price

Thirty Seconds To Change Rims

Absolutely the most simple and efficient demountable rim on the market today is the PRESTO. Always comes off easily—never sticks. By pulling down a lever the locking ring expands and forces off the rim. Prevents tire wobbling; has no loose parts. They have both Q. D. and demountable features.

The Only Demountable Rim for Wire Wheels

DEALERS—WRITE TODAY FOR OUR PROPOSITION ON THESE RIMS.

MANUFACTURERS—SEND FOR PRICES ON QUANTITY LOTS.

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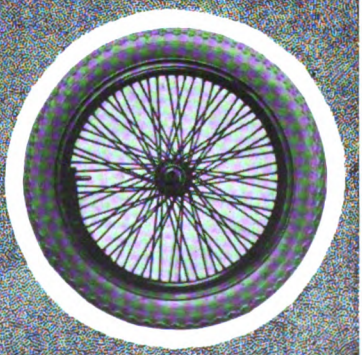
Western Sales Agents:
AMERICAN DISTRIBUTING CO., JACKSON, MICH.



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RODS (Continued)

ALUMINUM RODS

(See Aluminum, Sheet)

BRAKE RODS

CINCINNATI Ball Crank Co., Cincinnati, O. (See page 137.)

JACOBS Co., F. L., 451 Guoin St., Detroit, Mich.

MICHIGAN Electric Welding Co., 520 Hart Ave., Detroit, Mich. (See page 593.)

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

STANDARD Welding Co., Cleveland, O. (See Book Mark.)

BRASS RODS

(See Brass, Sheet)

CONNECTING RODS

(Finished or Machined Rods. For connecting rods in the rough—See Forgings, Drop)

BILLINGS & Spencer Co., Hartford, Conn.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y. (See page 429.)

MICHIGAN Crank Shaft Co., Lansing, Mich. (See page 149.)

STANDARD Gauge Steel Co., Beaver Falls, Pa. (See page 339.)

TINDEL-MORRIS Co., Eddystone, Pa.

TUBULAR Connecting Rod Co., 1790 Broadway, New York, N. Y. (See page opposite Title Page.)

COPPER RODS

(See Brass, Sheet)

FIBRE RODS

(See Fibre, Hard)

RUBBER RODS

(See Rubber, Hard)

STEEL RODS

(See Steel)

ROLLERS

CURTAIN ROLLERS

CAREY & Co., 246-48 N. Fifth St., Philadelphia, Pa. "Edw. Reukauf."

COWLES & Co., C., New Haven, Conn. (See page 463.)

EDW. REUKAUF—See Carey & Co.

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

ROPE

BRONZE WIRE ROPE OR CABLE

ELEPHANT—See Phosphor Bronze Smelting Co.

OMEGA—See Riverside Metal Co.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant." (See page 471.)

REEVES & Co., Paul S., 1415-25 Catherine St., Philadelphia, Pa.

RIVERSIDE Metal Co., Riverside, N. J. "Omega."

STEEL WIRE ROPE OR CABLE

AMERICAN Steel & Wire Co., 208 S. La Salle St., Chicago, Ill. (See page 451.)

BRODERICK & Bascom Rope Co., 817 N. Second St., St. Louis, Mo.

HAZARD Mfg. Co., 81 E. Ross St., Wilkes-Barre, Pa.

LESCHEN & Sons Rope Co., A., 920 N. First St., St. Louis, Mo.

MACOMBER & Whyte Rope Co., 507-09 S. Clinton St., Chicago, Ill.

ROEBLINGS Sons Co., John A., Trenton, N. J.

TRENTON Iron Co., Trenton, N. J.

WATERBURY Co., 80 South St., New York, N. Y.

WRIGHT Wire Co., Worcester, Mass.

ROPES

TOW ROPES

AMERICAN Steel & Wire Co., 208 S. La Salle St., Chicago, Ill. (See page 451.)

AUTOWLINE—See Broderick & Bascom Rope Co.

BRODERICK & Bascom Rope Co., 817 N. Second St., St. Louis, Mo. "Autowline."

HERCULES—See Leschen & Sons Rope Co.

HOGARTY, Edward, Unionville, Conn. "Utility."

JONES Auto Supply Co., 25th St. & Broadway, Oakland, Cal. "Pacific."

LESCHEN & Sons Rope Co., A., 920 N. First St., St. Louis, Mo. "Hercules."

PACIFIC—See Jones Auto Supply Co.

UTILITY—See Hogarty, Edward.

RUBBER

HARD RUBBER

(Sheet, Rod and Tube)

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

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"STANDARD"

PRODUCTS For Automobile Construction

CRANK SHAFTS FINISHED

Drop Forged. Slab Forged. High grade Open Hearth or any special alloy steels desired.

COLD DRAWN STEEL

Shafting—Flats. Squares—Special. Shapes for automobile work in any grade or analysis.

CONNECTING RODS COMPLETE

Made from Drop Forgings machined ready for assembly.

FINISHED MACHINE KEYS

Standard Gib Head. Round End Feathers. Standard Woodruff. Special Keys of every description.

The same extraordinary accuracy characterizes everything we make. If you use one of our products and it's satisfactory, why not try another?

STANDARD GAUGE STEEL CO.

BEAVER FALLS, PA.

1009 Pennsylvania Building, Philadelphia, Pa. 540 Old Colony Building, Chicago, Ill. Dilworth, Lockwood & Co., New York. R. B. Ridgley, Detroit, Mich. Dayton Iron & Steel Co., Dayton, Ohio.

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RUBBER (Continued)

HARD RUBBER (Continued)

DIAMOND Rubber Co., Akron, O.

LUZERNE Rubber Co., Trenton, N. J.

SIEMON Hard Rubber Co., Bridgeport, Conn.

STOKES Rubber Co., Jos., Trenton, N. J.

WILKIE Rubber Mfg. Co., Lynn, Mass.

SCRAPERS

CARBON SCRAPERS

ATLAS Machine Co., 110 W. Exchange St., Providence, R. I.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUFFUM Tool Co., Louisiana, Mo.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 539.)

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

STEELE & Collins Co., California Bldg., Los Angeles, Cal. "Vail."

VAIL—See Steele & Collins Co.

FOOT SCRAPERS

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O.

SIMPSON Specialty Co., 179 W. Maple St., Columbus, O.

SCREENS

HORN SCREENS

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y.

STANDARD Metal Mfg. Co., Newark, N. J. (See page 213.)

SCREW-EYES

BRASS AND IRON SCREW-EYES

BROOKS & Sons, M. S., Chester, Conn.

JENCKES Mfg. Co., E., 28 Union St., Worcester, Mass.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

WIRE Goods Co., 28 Union St., Worcester, Mass.

SCREWS

CAP AND SET SCREWS

ALLEN Mfg. Co., 135 Sheldon St., Hartford, Conn.

BRISTOL Co., Waterbury, Conn.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. (See pages 227 and 343.)

CLARK Bros. Bolt Co., Milldale, Conn. (See page 79.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

CRITCHLEY Machine Screw Co., Grand St., Ct., Worcester, Mass.

CURTIS Screw Co., Buffalo, N. Y.

DETROIT Screw Works, Detroit, Mich. (See page 341.)

EASTERN Machine Screw Corp., Barclay & Truman Sts., New Haven, Conn.

FERRY Cap & Set Screw Co., 2151 Scranton Rd., Cleveland, O.

FOSTER—See New Haven Machine Screw Co.

H. & M. Screw Co., Fostoria, O.

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn. (See page 297.)

HASKELL Mfg. Co., Wm. H., 24 Commerce St., Pawtucket, R. I.

MILES, Franklin S., 205-07 Quarry St., Philadelphia, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 269.)

NATIONAL Sewing Machine Co., Belvidere, Ill.

NEW Haven Machine Screw Co., New Haven, Conn. "Foster."

NIAGARA Screw Co., 20 Lock St., Buffalo, N. Y.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Lafayette St., Detroit, Mich.

PITTSBURG Screw & Bolt Co., Preble Ave. (N. S.), Pittsburg, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RHODE Island Tool Co., Providence, R. I.

ROCHESTER Machine Screw Co., Caledonia St., Rochester, N. Y.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCOVILL Mfg. Co., 224 N. Lake St., Chicago, Ill.

SHIMER & Sons, Samuel J., Milton, Pa.

STANDARD Screw Co., 79 Beacon St., Worcester, Mass.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 343.)

COACH AND LAG SCREWS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

CLARK Bros. Bolt Co., Milldale, Conn. (See page 79.)

HASKELL Mfg. Co., Wm. H., 24 Commerce St., Pawtucket, R. I.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

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WE have provided ourselves with a Supply of Special Material, also Taps and Gauges, and are prepared to furnish

Hexagon Head Screws, Nuts, etc.

which we guarantee fully up to the Specifications of the S. A. E.

Send us your specification

DETROIT SCREW WORKS

DETROIT, MICH.

Established 1877—36 Years of Progress

Standard Set and Cap Screws, Steel Taper Pins, Coupling Bolts, Nuts, etc.

"ANYTHING TURNED FROM BAR"

HARDENED and GROUND WORK OUR SPECIALTY

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SCREWS (Continued)

COACH AND LAG SCREWS (Continued)

NEW Castle Steel & Iron Co., New Castle, Pa.

OLIVER Iron & Steel Co., Pittsburg, Pa.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

LAG SCREWS

(See Screws, Coach and Lag)

MACHINE SCREWS

AMERICAN Screw Co., Providence, R. I.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., Cleveland, O.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

DETROIT Screw Works, Detroit, Mich. (See page 341.)

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn. (See page 297.)

INTERNATIONAL Machine & Screw Co., 172 Lyman St., Springfield, Mass.

MICHIGAN Screw Co., Lansing, Mich.

MILES, Franklin S., 205-07 Quarry St., Philadelphia, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 269.)

NATIONAL Screw & Tack Co., Stanton Ave., & C. & P. Ry., Cleveland, O.

NEW Haven Machine Screw Co., New Haven, Conn.

PROGRESSIVE Mfg. Co., Torrington, Conn.

RAMSDELL Specialty Co., W. Boylston St., Worcester, Mass.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RUSSELL & Erwin Mfg. Co. 94-98 Lafayette St., New York, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCOVILL Mfg. Co., 224 N. Lake St., Chicago, Ill.

STANDARD Screw Co., 79 Beacon St., Worcester, Mass.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 343.)

SET SCREWS

(See Screws, Cap and Set)

THUMB SCREWS

BILLINGS & Spencer Co., Hartford, Conn.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. (See pages 227 and 343.)

DEVLIN Mfg. Co., Thos., Third & Lehigh Aves., Philadelphia, Pa.

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

HASKELL Mfg. Co., Wm. H., 24 Commerce St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Lafayette St., Detroit, Mich.

ROCHESTER Machine Screw Co., Caledonia St., Rochester, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 343.)

WOOD SCREWS

AMERICAN Screw Co., Providence, R. I.

ATLANTIC Screw Works, Charter Oak Ave., Hartford, Conn.

BRIDGEPORT Screw Co., Bridgeport, Conn.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

FEDERAL Screw Corp., 393 Harris Ave., Providence, R. I.

INTERNATIONAL Machine & Screw Co., 172 Lyman St., Springfield, Mass.

NATIONAL Screw & Tack Co., Stanton Ave. & C. & P. Ry., Cleveland, O.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

SCREW MACHINE PRODUCTS

SPECIAL SCREW MACHINE PRODUCTS TO ORDER

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMERICAN Pin Co., Waterbury, Conn.

ANSONIA Mfg. Co., Ansonia, Conn.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y. (See page 247.)

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

ATLAS Brass Foundry Co., 980-90 S. Front St., Columbus, O.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich. (See page 209.)

BABSON-DOW Mfg. Co., Boston, Mass. (See page 343.)

BALL & Roller Bearing Co., Danbury, Conn. (See page 423.)

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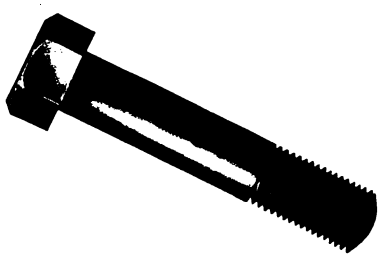
Accurate Screw Machine Products

BABSON-DOW MANUFACTURING CO.

BOSTON, MASS.

"Parts That Fit"

Set Screws
Cap Screws
Studs
Taper Pins
Semi-Fin Nuts
Castle Nuts



Special Work
Gear Blanks
Clevis Pins
Conn Rod Bolts
Spring Shackle Bolts
Valve Lifters
Valve Rollers
Idler Studs

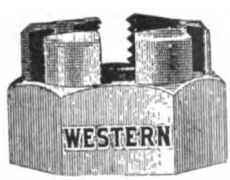
THE CHICAGO SCREW CO.

Est. 1872 Homan Ave. & Fillmore St. CHICAGO, ILL.

Standard S.A.E. or A.L.A.M. Hexagon Plain & Castle Nuts

Carried in Stock

Large Quantities of sizes ranging from 1-4" to 1" inclusive which insures prompt delivery.



Our Nuts

Are turned from bar stock which has a tensile strength of 90,000 lbs. per square inch and an elastic limit of 75,000 lbs.

"Specials" made to "Order." Any piece from Iron, Steel, Brass or Bronze which can be turned in a screw machine.

"Western Service Book" can be had for the asking.

The Western Automatic Machine Screw Co.

750 LAKE AVENUE, ELYRIA, OHIO

Detroit Sales Office: 1019 Dime Bank Bldg. Established 1873 Cleveland Sales Office and Warehouse: 1224 West 6th St.

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SCREW MACHINE PRODUCTS (Continued)

SPECIAL SCREW MACHINE PRODUCTS TO ORDER (Continued)

BARNES Co., Wallace, Wallace & Parallel Sts., Bristol, Conn.
(See page 397.)

BELVIDERE Screw & Machine Co., Belvidere, Ill.

BLAIR Tool & Machine Works, 521 Greenwich St., New York, N. Y.

BLAKE & Johnson Co., Waterbury, Conn.

BRIDGEPORT Metal Goods Mfg. Co., Howard Ave. & Spruce St., Bridgeport, Conn.

CASSADY-FAIRBANK Mfg. Co., 6106-20 La Salle St., Chicago, Ill.

CHICAGO Automatic Machine Co., Oakley Ave. & Kinzie St., Chicago, Ill.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill.
(See pages 227 and 343.)

CINCINNATI Ball Crank Co., Cincinnati, O.
(See page 137.)

CLARK Novelty Co., 380 Exchange St., Rochester, N. Y.

CLIMAX Machinery Co., 143-63 E. Morris St., Indianapolis, Ind.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

CORNWALL & Patterson Mfg. Co., Bridgeport, Conn.

CRITCHLEY Machine Screw Co., Grand Street Ct., Worcester, Mass.

CURTIS Screw Co., Buffalo, N. Y.

DEFIANCE Screw Machine Products Co., Defiance, O.

DETROIT Screw Works, Detroit, Mich.
(See page 341.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

EASTERN Machine Screw Corp., Barclay & Truman Sts., New Haven, Conn.

ERICSSON Screw Machine Products Co., 601 Bergen St., Brooklyn, N. Y.

FARIES Mfg. Co., Decatur, Ill.

FISCHER Special Mfg. Co., 2076-78 Reading Rd., Cincinnati, O.

FRIES & Co., Buffalo, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GREER, Fredric, 525 W. Van Buren St., Chicago, Ill.

H. & M. Screw Co., Fostoria, O.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANSON, Henry L., 25 Union St., Worcester, Mass.

HANSON Bros., 533-48 Southington Ave., Plainville, Conn.

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn.
(See page 297.)

HILL Co., Geo. Q., 32-34 Dorchester Ave., Boston, Mass.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

INDIANAPOLIS Tool & Mfg. Co., Indianapolis, Ind.

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich.
(See pages 301 and 315.)

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

KRAHN Mfg. Co., 588 Clinton St., Milwaukee, Wis.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 135.)

McCULLY, R. P. & C. H., 331-35 Van Buren St., Brooklyn, N. Y.

MACHINE Parts Co., Elyria, O.

METAL Stamping Co., Racine, Wis.

MICHIGAN Screw Co., Lansing, Mich.

MILHOLLAND Machine Co., W. K., 29th & Canal Sts., Indianapolis, Ind.

MOORE, George W., 15 Chardon St., Boston, Mass.

MOSSBERG Co., Frank, Attleboro, Mass.
(See page 553.)

NATIONAL-ACME Mfg. Co., Cleveland, O.
(See page 269.)

NATIONAL Cycle & Mfg. Co., Bay City, Mich.

NATIONAL Sewing Machine Co., Belvidere, Ill.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NEW Haven Machine Screw Co., New Haven, Conn.

OHIO Metal Products Co., 39 N. Edgar St., Dayton, O.

OLSON Mfg. Co., Worcester, Mass.

PARAGON Brass Works, 224 Canal St., New York, N. Y.

PEERLESS Automatic Machine Co., 1970 W. 77th St., Cleveland, O.

PENINSULAR Milled Screw Co., Lafayette St., Detroit, Mich.

PERRY-FAY Mfg. Co., Elyria, O.

PHILADELPHIA Machine Screw Works, 624-26 Race St., Philadelphia, Pa.

RAMSDELL Specialty Co., W. Boylston St., Worcester, Mass.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

RHODE Island Tool Co., Providence, R. I.

ROSS Machine Co., 208 S. Fourth St., La Fayette, Ind.

RUMMEL Machine Screw Co., 1978-80 W. 77th St., Cleveland, O.

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y.
(See page 507.)

Complete Index to Classification appears on Pages 8 to 26.

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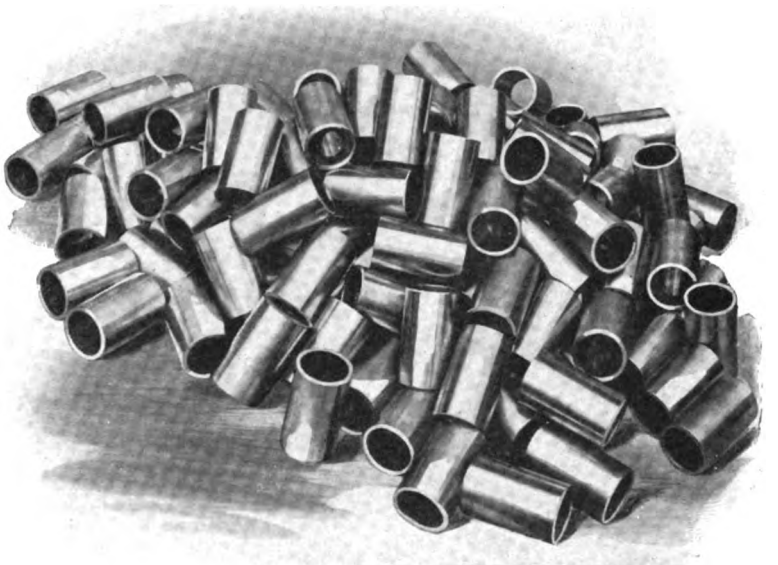
Bunting's Bronze Bushings

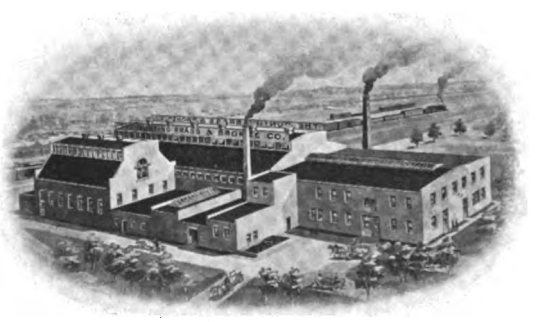


Completely Machined and Ready for Assembly

Over 200 Manufacturers Are Using Them—Let Us Quote YOU

No Patterns Required

We possess the greatest pattern and tool equipment in existence, and the use of this equipment is at our customer's service.



Ask for price list "C" containing 1300 standard sizes.

A factory devoted to Bushings and operated by Bushing specialists.

The Bunting Brass & Bronze Co.

737 Spencer St. Toledo, Ohio

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SCREW MACHINE PRODUCTS (Continued)

SPECIAL SCREW MACHINE PRODUCTS TO ORDER (Continued)

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCOVILL Mfg. Co., 224 N. Lake St., Chicago, Ill.

SCREW Machine Products Corp., 1012 Eddy St., Providence, R. I.

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 475.)

SMITH Mfg. Co., F. H., 3037 Carroll Ave., Chicago, Ill.

SNOW-DOLE-RICHARDS Co., 9-15 Murray St., New York, N. Y.

STANDARD Engineering Works, 90 Exchange St., Pawtucket, R. I.

STANDARD Mfg. Co., 990 Housatonic Ave., Bridgeport, Conn.

STANDARD Screw Co., 79 Beacon St., Worcester, Mass.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

SUPERIOR Lamp Mfg. Co., 136 W. 52d St., New York, N. Y.

SWOPE-McCRACKEN Co., Elks Temple, Detroit, Mich.

TORRINGTON Mfg. Co., Torrington, Conn.

U. S. Automatic Co., Amherst, O.

UNIVERSAL Machine Co., 501 E. Preston St., Baltimore, Md.

VOELKNER & Harry Mfg. Co., 282-92 Woodbridge St., E., Detroit, Mich.

WATERBURY Mfg. Co., Waterbury, Conn.

WATKINS Co., D. M., Pine & Eddy Sts., Providence, R. I.

WELMADE Screw & Mfg. Co., Fitchburg, Mass.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O.
(See page 343.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WESTERN Screw-Products Co., 3200-14 S. Seventh St., St. Louis, Mo.

WOLVERINE Screw Co., 51-53 Fort St., E., Detroit, Mich.

SEARCHLIGHTS

ACETYLENE SEARCHLIGHTS

(See Lamps, Acetylene)

ELECTRIC SEARCHLIGHTS

(See Headlights, Electric)

SEATS

SUPPLEMENTARY SEATS

AMESBURY Brass & Foundry Co., Amesbury, Mass.

BUFFINGTON & Co., C. A., Berkshire, N. Y.

CHICAGO Coach & Carriage Co., 1223-31 S. Michigan Ave., Chicago, Ill.

EMPIRE Gear & Top Co., 207 N. 22d St., Philadelphia, Pa.

EUREKA Seat Co., 407-11 Rhode Island Ave., Buffalo, N. Y.

HILL Mfg. Co., 25-27 Fuller St., Buffalo, N. Y.

HODGE & Graves Co., Amesbury, Mass. "Luxury."
(See page 349.)

KIMBALL & Co., C. P., Chicago, Ill.
(See page 87.)

LUXURY—See Hodge & Graves Co.

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

POLSON Mfg. Co., 27 Chenango St., Buffalo, N. Y.

SEPARATORS

BOW SEPARATORS

(See also Holders, Top)

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

AUTO Specialties Mfg. Co., 306 Fisher Bldg., Chicago, Ill. "Bair."
(See page 347.)

BAIR—See Auto Specialties Mfg. Co.

CANFIELD Rubber Co., Bridgeport, Conn.

COWLES & Co., C., New Haven, Conn.
(See page 463.)

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 365.)

DESOCO—See Detroit Socket Co.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich, "Desoco."

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

NEVER-RUB—See Springfield Auto Top & Upholstering Co.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

SPRINGFIELD Auto Top & Upholstering Co., 224-30 Dwight St., Springfield, Mass. "Never-Rub."

THOMPSON Mfg. Co., Watertown, Mass.

UFASCO—See Unique Findings & Supply Co.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I. "Ufasco."

Complete Index to Classification appears on Pages 8 to 26.

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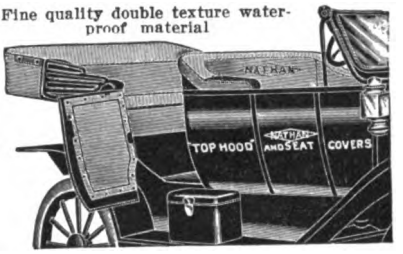
SEAT COVERS For all makes of cars

FORD FORD FORD

Fine quality double texture water-proof material



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The only Perfect Fitting Tire Covers that are water and dust proof when placed in any position

Here we show a few of our articles. Our Auto and Motor Cycle Catalogues (mailed on request) contain descriptions and prices of many others. Special quotations to Manufacturers, Jobbers and Dealers. Send for them.

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Patented in U. S. and Canada

A clean-cut mechanical device that divides the *weight* of the top. When the BAIR HOLDERS are locked on the bows the entire top is held *rigid*—as in a vise—preventing *rattling*, *spread* or *broken* bows.

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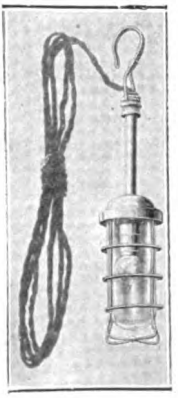

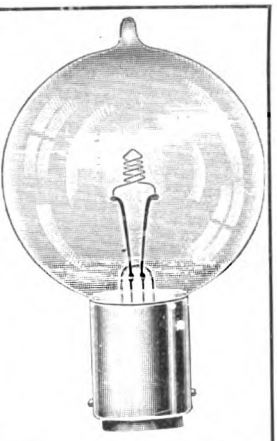

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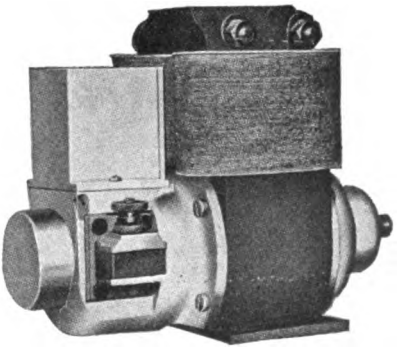

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SEPARATORS (Continued)

BOW SEPARATORS (Continued)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

GASOLINE SEPARATORS

(See Strainers, Gasoline)

SHAFTING

FLEXIBLE SHAFTING

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

COATES Clipper Mfg. Co., 237 Chandler St., Worcester, Mass.

COOPER Flexible Transmission Co., Eighth Ave. & 18th St., Brooklyn, N. Y.

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

INTERLOCKED Metallic Hose Co., Orchard & Scott Sts., Newark, N. J.

NEW Jersey Flexible Shaft & Machine Co., 52-60 Dickerson St., Newark, N. J.

P R Mfg. Co., 621 Bellevue Ave., Detroit, Mich.

STOW Flexible Shaft Co., 26th & Callowhill Sts., Philadelphia, Pa.

WEBB Mfg. Co., ft. Center St., Newark, N. J.
(See page 69.)

WHITE Dental Mfg. Co., S. S., 5-9 Union Sq., W., New York, N. Y.

SHAFTS

CAMSHAFTS

(See Camshafts, Finished)

COUNTERSHAFTS

(See Countershafts, Finished)

CRANKSHAFTS

(See Crankshafts; also Forgings, Drop)

FLEXIBLE SHAFTS

(See Shafting, Flexible)

PROPELLER SHAFTS

HARTFORD Auto Parts Co., Hartford, Conn.

KINSLER-BENNETT Co., 69 Vernon St., Hartford, Conn.
(See page 227.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 513.)

SPICER Mfg. Co., Plainfield, N. J.
(See page 225.)

SHEAVES

SHEAVES AND PULLEYS

(For Horn and Cut-out Cables)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

SHELLS

COPPER BOILER SHELLS

RANDOLPH-CLOWES Co., Waterbury, Conn

STEEL BOILER SHELLS

JANNEY, Steinmetz & Co., Philadelphia, Pa.
(See page 399.)

PRESSED Steel Tank Co., West Allis, Wis.

SHIELDS

WIND SHIELDS

A. B. C. O.—See Auto Brass Mfg. Co.

ACKERMAN—See Smith & Co.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ANSONIA Mfg. Co., Ansonia, Conn.

AUTO Brass Mfg. Co., 56 Friendship St., Providence, R. I. "A. B. C. O."

AUTO Parts Mfg. Co., Jackson & Michigan Sts., Milwaukee, Wis. "Badger."

AUTO Wind Shield Co., University Rd., Cambridge, Mass.

BADGER—See Auto Parts Mfg. Co.

BANKER Wind Shield Co., Ellsworth & Negley Aves., Pittsburg, Pa.

BEAN Windshield Co., 466 Main St., Malden, Mass.

CHICAGO Coach & Carriage Co., 1223-31 S. Michigan Ave., Chicago, Ill.

CLARK & Son, A. N., Plainville, Conn.

COLLINS & Son, G. A., Main & Church Sts., Akron, O.

COLUMBIA Tire & Top Co., 1014 Commonwealth Ave., Boston, Mass.

COLUMBUS Auto Parts Co., Columbus, O.

CONOVER—See Page Woven Wire Fence Co.

COX Brass Mfg. Co., Albany, N. Y.
(See page 511.)

CRANMER, Harry C., 223 S. 24th St., Philadelphia, Pa. "Philadelphia."

DIAMOND Mfg. Co., Detroit, Mich.

DOUGLAS & Lomason Co. Detroit, Mich.
(See page 205.)

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Automobile Castings in Brass, Aluminum, Bronze.

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SHIELDS (Continued)

WIND SHIELDS (Continued)

DUQUESNE Auto Parts Co., 5715-17 Kirkwood St., Pittsburg, Pa.

EMPIRE Gear & Top Co., 207 N. 22d St., Philadelphia, Pa.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

FRYER Co., Charles H., 11 Pine St., Providence, R. I.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Milwaukee," "Gemco."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

HARTFORD Windshield Mfg. Co., 1006 S. Los Angeles St., Los Angeles, Cal.

HEARD Mfg. Co., 1318 S. Main St., Los Angeles, Cal.

J. H.—See Mutual Auto Accessories Co.

KIMBALL & Co., C. P., Chicago, Ill.
(See page 87.)

KINSEY Mfg. Co., Toledo, O. "Kinwood."

KINWOOD—See Kinsey Mfg. Co.

KRAHN Mfg. Co., 588 Clinton St., Milwaukee, Wis.

LONDON Auto Supply Co., 2540-48 Wabash Ave., Chicago, Ill.

MANHATTAN Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MEDINA Stamping & Machine Co., Medina, N. Y. "Whirlwind."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

METALWOOD Mfg. Co., Leib & Wight Sts., Detroit, Mich.

MILWAUKEE—See Garage Equipment Mfg. Co.

MOORE Co., W. J., Montague Ave. & Joy St., Caro, Mich.

MURRAY & Co., P. A., Newton, Mass.

MUTUAL Auto Accessories Co., 58 W. 65th St., New York, N. Y. "J. H."

NATIONAL Auto Top Co., 244-50 W. 49th St., New York, N. Y.

PAGE Woven Wire Fence Co., Adrian, Mich "Conover."

PEERLESS—See Sisson Mfg. Co.

PERFECTO Wind Deflector Co., 67 Church St., Boston, Mass.

PHILADELPHIA—See Cranmer, Harry C.

POLSON Mfg. Co., 27 Chenango St., Buffalo, N. Y.

RANDS Mfg. Co., Holden & Lincoln Aves., Detroit, Mich.

ROSTAND Mfg. Co., Milford, Conn.

SISSON Mfg. Co., 76 Main St., Buffalo, N. Y. "Peerless."

SMITH, H. Lund, 199-203 Paterson St., Paterson, N. J.

SMITH & Co., Jos. N., Detroit, Mich. "Ackerman."
(See page 203.)

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

SUPERIOR Mfg. Co., Ann Arbor, Mich.

TROY Carriage Sun Shade Co., Troy, O.

UNION Auto Specialties Co., Brookville, Pa.

UNIVERSAL Wind Shield Co., 1614 Prairie Ave., Chicago, Ill.

VANGUARD Mfg. Co., Detroit, Mich.
(See page 349.)

WESTERN Auto-Body & Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WHIRLWIND—See Medina Stamping & Machine Co.

SHIFTERS

AUTOMATIC GEAR SHIFTERS

BUNGAY Mfg. Co., Court & Ninth Sts., Brooklyn, N. Y.

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis. "Vulcan."
(See page 185.)

GRAND Rapids Show Case Co., Grand Rapids, Mich.
(See page 351.)

GRAY—See Research Co.

LEWIS Mfg. Co., 1229 N. 51st St., Philadelphia, Pa.

MECHANO Gear Shift Co., 144 Division St., Grand Rapids, Mich.

RESEARCH Co., Peoples Gas Bldg., Chicago, Ill. "Gray."

VULCAN—See Cutler-Hammer Mfg. Co.

SHIMS

BRASS AND COPPER SHIMS AND LINERS

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CHANDLER Co., Napier St., Springfield, Mass.

FITZGERALD Mfg. Co., Torrington, Conn.
(See page 213.)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

GOODWIN & Kintz Co., Winsted, Conn.

KALES-HASKEL CO., 441-53 Lafayette Blvd., Detroit, Mich.

KICKHAEFER Mfg. Co., 199-201 Oregon St., Milwaukee, Wis.

LAMINATED Shim Co., 537-41 Canal St., New York, N. Y.
(See page 351.)

McCORD Mfg. Co., Detroit, Mich.
(See pages 176 and 177.)

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

VICTOR Mfg. & Gasket Co., Troy & 21st Sts., Chicago, Ill.

SHOCK ABSORBERS

(See also Straps, Rebound; also Springs, Supplementary)

A. V.—See Hudson Export & Import Co.

A. & J. Mfg. Co., Binghamton, N. Y. "Mondex."

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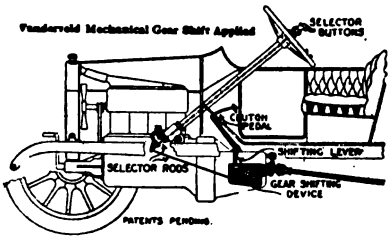

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AMES—See Peacock & Co.

ANDERSON Spring Co., Detroit, Minn.

BENZ Automobile Sales Corp., 1700 Broadway, New York, N. Y. (Importers.) "Houdaille."

BOWEN Mfg. Co., Auburn, N. Y. "Empress."
(See page 149.)

BUCKEYE Suspension Co., 1253 W. Second St., Cleveland, O. "Gresser."

CONNECTICUT Shock Absorber Co., Meriden, Conn.
(See pages 396A and 396B.)

COX Brass Mfg. Co., Albany, N. Y. "E-Zer."
(See page 511.)

CUSHIONET—See Walker-Moore Mfg. Co.

D. & D. Air Device Co., 2132 S. Michigan Ave., Chicago, Ill.

DONNELLY Motor Equipment Co., 1779 Broadway, New York, N. Y. "Ely."
(See page 371.)

E-ZER—See Cox Brass Mfg. Co.

ECLIPSE—See Herz & Co.

ELY—See Donnelly Motor Equipment Co.

EMPRESS—See Bowen Mfg. Co.

FLENTJE, Ernst, Cambridge, Mass.
(See page 489.)

FORBES, Walter J., 243 Columbus Ave., Boston, Mass. "Knojah."

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GRESSER—See Buckeye Suspension Co.

GURNEY, C. S., Portsmouth, N. H.

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J. "Truffault-Hartford."
(See page 353.)

HERZ & Co., 245 W. 55th St., New York, N. Y. (Importers.) "Eclipse."
(See page 303.)

HOOVER Spring Co., 617-37 Turk St., San Francisco, Cal.

HOUDAILLE—See Benz Automobile Sales Corp.

HUDSON Export & Import Co., 1737 Broadway, New York, N. Y. (Importers.) "A. V."

IDEAL—See American Sales Co.

J. H. S.—See Sager Co.

KILGORE Mfg. Co., 727 Boylston St., Boston, Mass.

KNOJAH—See Forbes, Walter J.

LANDIS Engineering & Mfg. Co., Waynesboro, Pa.

MARTIN Shock Absorber Corp., 1301-1401 E. Slauson Ave., Los Angeles, Cal.

MESINGER Mfg. Co., H. & F., Austin Pl. & E. 144th St., New York, N. Y.

MOGUL Starter Co., 1323 Michigan Ave., Chicago, Ill.

MONDEX—See A. & J. Mfg. Co.

PEACOCK & Co., Clarence N., 1790 Broadway, New York, N. Y. "Ames."

PENFIELD Shock Absorber Mfg. Co., 49 Randolph Ave., Meriden, Conn.

PETELER Shock Absorber Corp., 1997 Broadway, New York, N. Y.

REX—See Rock, John G.

ROCK, John G., 452 W. Lincoln Ave., Mt. Vernon, N. Y. "Rex."

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "J. H. S."

TEMCO Electric Motor Co., Leipsic, O.

TRUFFAULT - HARTFORD — See Hartford Suspension Co.

WALKER-MOORE Mfg., Co., 310 Walker St., Racine, Wis. "Cushionet."

WESTINGHOUSE Air Spring Co., Smedley Bldg., New Haven, Conn.

SHOES

INNER TIRE SHOES

(Shoes or Sleeves to be used between outer shoe and inner tube as a protector and reinforcement. For Outer Shoes or Manchons—See Sleeves, Tire Repair)

ACME—See Jackson-Eno Rubber Co.

ALDING—See Alsten & Goulding Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMERICAN Rubber Products Co., Austin, Ill.

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O.

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Chemico."
(See page 131.)

ATLAS Rubber Co., 226-30 N. Jefferson st., Chicago, Ill.

AVON—See Gray Specialty Co.

BROCKETT-GORHAM Co., N. State St., Marion, O. "Marion."

BROWNIE—See States Mfg. Co.

BUCKEYE—See Rubber Goods Supply & Mfg. Co.

BULL DOG—See Pennsylvania Rubber Co.

BULL DOG—See Polson Bros. Mfg. Co.

CHEMICO—See Atlas Auto Supply Co.

CONTINENTAL Rubber Works, Erie, Pa.

COX, David H., Chestnut St., Roselle, N. J.

DOUBLE Fabric Tire Co., 60 W. Ninth St., Auburn, Ind. "Interlock."

DYKES Co., John L. G., 222 N. State St., Chicago, Ill.

EGYPTIAN—See Polson Bros. Mfg. Co.

ESSEX Rubber Co., Trenton, N. J.

EXCEL Rubber Co., Akron, O.

FALLS Rubber Co., Cuyahoga Falls, O.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

FIRESTONE Tire & Rubber Co., Akron, O.

FISHER Mfg. Co., 1530 N St., Lincoln, Neb.

FLEXSTEEL—See Standard Sales Co.

GOODYEAR Tire & Rubber Co., Akron, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Avon."

Complete Index to Classification appears on Pages 8 to 26.

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Modern automobile accessories of merited distinction, each a quality product and the leader in its class—designed to ensure comfort, to promote economy, and to increase the factor of safety.

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"The Pioneer and the Best." Increases tire mileage, prevents spring breakage, overcomes destructive vibration and "Makes Every Road a Boulevard." 250,000 motorists are enjoying its use. 25 leading makers have adopted it as regular equipment.

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Beautifies a car and makes collisions harmless.

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Gives spring flexibility when spring flexibility is desired and maximizes comfort.

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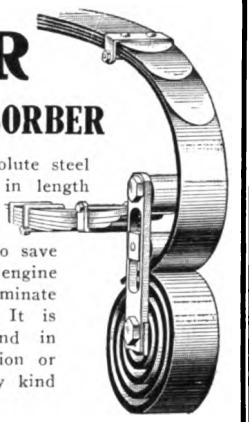

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We are offering a very attractive
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ELIMINATE THE REBOUND
The retail price is only $20 per pair, and we guarantee satisfaction. Let us hear from you today.

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Blades taper from $\frac{1}{4}''$ to $\frac{1}{8}''$ in thickness.

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SHOES (Continued)

INNER TIRE SHOES (Continued)

HAGSTROM Bros. Mfg. Co., Lindsborg, Kan.

HAMPTON Mfg. Co., 1520 W. Washington St., Indianapolis, Ind. "Kant-blo."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

IDEAL—See Voorhees Rubber Mfg. Co.

INDIA Rubber Tire Co., 1461-63 Michigan Ave., Chicago, Ill.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

INNER Shoe Tire Co., Front & Allen Sts., Grand Rapids, Mich. "Innershu," "Shurhold," "Klincher."

INNERSHU—See Inner Shoe Tire Co.

INTERLOCK—See Double Fabric Tire Co.

INVINCIBLE Tire Co., 53 Sabin St., Providence, R. I.

JACKSON-ENO Rubber Co., 1010 S. Main St., Los Angeles, Cal. "Acme," "Peerless," "Samson." "Leech."

JOHNSON & Co., W. L., Endicott, N. Y. "Utility."
(See page 355.)

K & W Rubber Co., Orange St., Ashland, O. "Maxotire."
(See page 493.)

K-C—See Western Tire & Rubber Co.

KANT-BLO—See Hampton Mfg. Co.

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa.

KLINCHER—See Inner Shoe Tire Co.

LEATHER Tire Goods Co., Niagara Falls, N. Y. "Woodworth."
(See page 57.)

LEE Tire & Rubber Co., Conshohocken, Pa.

LEECH—See Jackson-Eno Rubber Co.

LION Liner Co., 1219 N. Eighth St., Sheboygan, Wis.

M. & M. Mfg. Co., Akron, O.

MARION—See Brockett-Gorham Co.

MARTEL Blow-Out Protector Co., 336-38 W. 63d St., Chicago, Ill.

MATTSON Rubber Co., Lodi, N. J.
(See page 471.)

MAXOTIRE—See K & W Rubber Co.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MODEL—See Voorhees Rubber Mfg. Co.

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill. "Rough Rider."
(See page 131.)

O'NEIL Tire & Protector Co., W. Exchange & Water Sts., Akron, O.

PACIFIC Leather Works, 239 12th St., Oakland, Cal. "Sierra."

PEERLESS—See Jackson-Eno Rubber Co.

PEERLESS—See Polson Bros. Mfg. Co.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PENNSYLVANIA Rubber Co., Jeannette, Pa. "Bull Dog."

PERFECT Tire Sales Co., 118 S. 16th St., Philadelphia, Pa. "Reason."

POLSON Bros. Mfg. Co., 331 Southwest Blvd., Kansas City, Mo. "Bull Dog," "Egyptian," "Peerless."

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REASON—See Perfect Tire Sales Co.

ROUGH RIDER—See Nemo Chemical & Specialty Mfg. Co.

RUBBER Goods Supply & Mfg. Co., Akron, O. "Buckeye."

RUTHERFORD Rubber Co., Rutherford, N. J.

SAMSON—See Jackson-Eno Rubber Co.

SECURITY Blow-out Holder Mfg. Co., Leggett Bldg., Fairfield, Ia.

SECURITY Reliner Co., 33 Meade St., Montgomery, N. Y.

SHUR-HOLD—See Inner Shoe Tire Co.

SIERRA—See Pacific Leather Works.

STANDARD Sales Co., Hippodrome Bldg., Cleveland, O. "Flexsteel."

STAR—See States Mfg. Co.

STATES Mfg. Co., 1029-37 W. Adams St., Chicago, Ill. "Brownie," "Star."

THERMOID Rubber Co., Trenton, N. J.
(See page 55.)

TIRE Interlining Co., 2642 Stanton Ave., Cincinnati, O.

TRAVER Blowout Patch Co., Thoroughfare Bldg., New York, N. Y.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

UTILITY—See Johnson & Co.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. "Ideal," "Model."
(See page 355.)

WABAN Webbing Co., 207 Essex St., Boston, Mass.

WEARWELL Rubber Co., Kokomo, Ind.

WESTERN Tire & Rubber Co., 1701-03 Grand Ave., Kansas City, Mo. "K-C."

WOODWORTH—See Leather Tire Goods Co.

ZEE ZEE Tire & Rubber Co., 33d & Walnut Sts., Philadelphia, Pa.

SIGHT-FEEDS

INDEPENDENT SIGHT-FEEDS

AMERICAN Brass & Iron Co., Detroit, Mich.
(See page 83.)

CRUM-WILEY Mfg. Co., Peru, Ind.

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANS Motor Equipment Co., La Crosse, Wis.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

KRAHN Mfg. Co., 588 Clinton St., Milwaukee, Wis.

LAVIGNE Mfg. Co., 625-41 Commonwealth Ave., Detroit, Mich.

LEE Co., Wm. O., Port Huron, Mich.
(See page 111.)

Complete Index to Classification appears on Pages 8 to 26.

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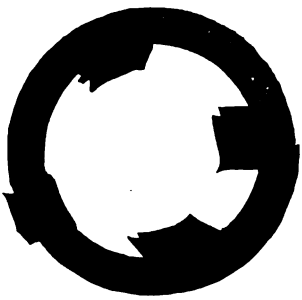
For brake lining that will give the most dependable service and always stop the car within the safety zone insist upon

AMBESCO

AMBESCO has built into it all the skill and experience in the world in the manufacture of brake lining and is composed of the finest materials that can be obtained. It is a lining that a dealer should sell if he wants a really satisfied customer. It is little short of a crime to sell inferior brake lining because of the resulting danger.

American Asbestos Company
NORRISTOWN PENNSYLVANIA

For the reputation of your establishment carry the best known and most successful brake lining—AMBESCO.



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REAL AUTO TIRE LIFE PROLONGERS

Equip your cars with these and save expense of extra tires. Made for real service, of standardized high grade new material.

There is only one "Ideal" in quality, construction and finish.

Manufactured only by

VOORHEES RUBBER MFG. CO.

Manufacturers of repair materials and automobile accessories of all kinds.

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Everything in Fabric and Leather Tire Reinforcements

Dealers:—You can't get our Quality at a lower price **anywhere.**

Our Utility reliners are made from high-grade frictioned fabric and fit perfectly.

Style F inside patch 6 ply.

Made in three sizes to fit 2½ to 5 in. tires.

Utility outside **Chrome Sole-Leather Sleeve:**

Moulded exact shape and size to outside of tire. **Guarantee** to run 1,000 miles.

Our goods guaranted to make good or we will. YOU can give a money-back guarantee to your customers —because we stand back of you.

Write for pamphlet, giving complete line and prices —NOW.

W. L. JOHNSON & CO.
Endicott, New York

LEATHER SLEEVE, STYLE A.

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SIGHT-FEEDS (Continued)

INDEPENDENT SIGHT-FEEDS (Continued)

LUNKENHEIMER Co., 222 E. Eighth Ave., Cincinnati, O.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

PEDERSEN Lubricator Co., 636 First Ave., New York, N. Y. (See page 245.)

UNITED States Gauge Co., New York, N. Y. (See page 558.)

WILKINSON Co., Wm. H., West Medway, Mass.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

SIGNALS

REAR TRAFFIC SIGNALS

ADAMS & Co., Edward S., Columbus, O. "Columbus."

AUTO Signalite Co., 735 Seventh Ave., New York, N. Y.

BAER Mfg. Co., North American Bldg., Philadelphia, Pa.

COLUMBUS—See Adams & Co.

COWLES & Co., C., New Haven, Conn. (See page 463.)

DIRECTOR—See National Lamp & Signal Works.

FAWKES Auto Co., Minneapolis, Minn.

INTERNATIONAL Signal Co., 1503 Michigan Ave., Chicago, Ill. "Isco."

ISCO—See International Signal Co.

J-M MOBILITE—See Johns-Manville Co.

JOHNS-Manville Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M Mobilite."

MOSLER & Co., A. R., Mt. Vernon, N. Y. (See page 299.)

NATIONAL Lamp & Signal Works, Michigan Ave. & 15th St., Chicago, Ill. "Director."

QUARTETTE Automobile Signal Co., 125 W. 35th St., Los Angeles, Cal.

ROBERTS, F. C., 1226 Woodward Ave., Detroit, Mich.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa.

STANDARD Signal Lamp Co., Sanford Bldg., Bridgeport, Conn.

SILK

SPOOL SILK

MEYER & Co., John C., Lowell, Mass.

SAUQUOIT Silk Mfg. Co., Philadelphia, Pa.

UPHOLSTERY SILK

CHENEY Bros., South Manchester, Conn.

SAUQUOIT Silk Mfg. Co., Philadelphia, Pa.

SLEEVES

TIRE REPAIR SLEEVES OR BANDS

(For lacing or strapping around a tire to close a puncture or blowout. For Sleeves to be used between inner tube and outer shoe—See Shoes, Inner Tire)

ALDING—See Alsten & Goulding Co

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMERICAN Rubber Products Co., Austin, Ill.

ATLAS Rubber Co., 226-30 N. Jefferson St., Chicago, Ill.

BATAVIA Rubber Co., Batavia, N. Y.

BRICTSON Mfg. Co., Brookings, S. Dak.

BUCKEYE—See Rubber Goods Supply & Mfg. Co.

BULL DOG—See Polson Bros. Mfg. Co.

BULL MOOSER—See Nemo Chemical & Specialty Mfg. Co.

CENTURY—See Nemo Chemical & Specialty Mfg. Co.

CHICAGO Leather Specialty Co., 345 W. Michigan St., Chicago, Ill.

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill. "Krome."

COLORADO Tire & Leather Co., 1340 Acoma St., Denver, Colo. "Durable."

CONTINENTAL Rubber Works, Erie, Pa.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

COX, David H., Chestnut St., Roselle, N. J.

DAVIS Co., W. C., 237 N. Main St., Brockton, Mass. "Star."

DOUBLE Fabric Tire Co., 60 W. Ninth St., Auburn, Ind.

DURABLE—See Colorado Tire & Leather Co.

DYKES Co., John L. G., 222 N. State St., Chicago, Ill.

ECONOMY Tread Co., 113 Lenox Ave., New York, N. Y.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

EVERLASTING—See Legnard & Co.

EXCEL Rubber Co., Akron, O.

FALLS Rubber Co., Cuyahoga Falls, O.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

FIRESTONE Tire & Rubber Co., Akron, O.

G & K—See Graton & Knight Mfg. Co.

GILBERT Mfg. Co., New Haven, Conn.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K." (See page 67.)

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

IDEAL—See Voorhees Rubber Mfg. Co.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

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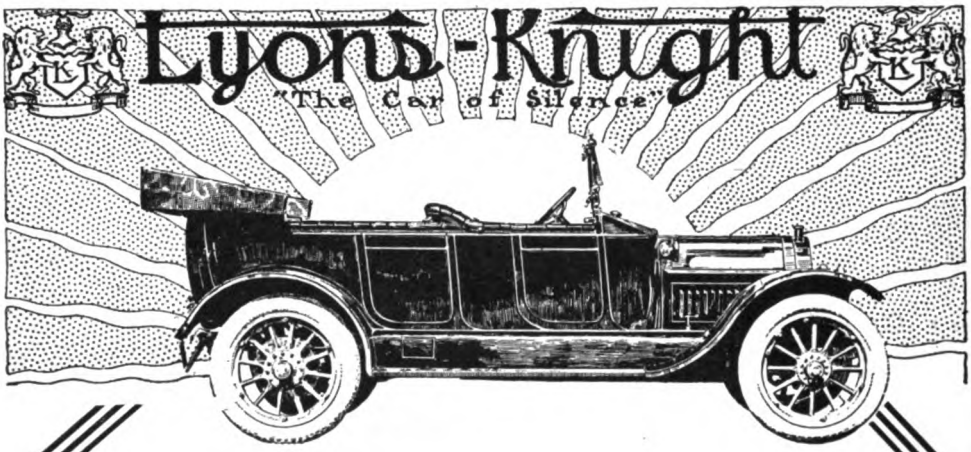

One Year Ago —And Today

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We have made good in every one of our promises. There are Lyons-Knight cars from San Juan to Seattle, from Wisconsin to Texas which are showing this value which we promised. You can find them today in all of the principal cities, and wherever you find them you will see actual evidence of their value.

Don't Overlook this Opportunity

The Lyons-Knight dealers' proposition is an especially attractive one—one which will pay YOU to investigate. There are a few good territories which are still open—perhaps yours is one of them. Write or wire today—find out if your territory is still open and ask for full particulars.

LYONS ATLAS COMPANY

Indianapolis

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SLEEVES (Continued)

TIRE REPAIR SLEEVES OR BANDS (Continued)

INNER Shoe Tire Co., Front & Allen Sts., Grand Rapids, Mich.

JACKSON-ENO Rubber Co., 1010 S. Main St., Los Angeles, Cal.

JOHNSON & Co., W. L., Endicott, N. Y. "Utility."
(See page 355.)

K & W Rubber Co., Orange St., Ashland, O.
(See page 493.)

K-C—See Western Tire & Rubber Co.

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa.

KIMBALL Tire Case Co., 168 Broadway, Council Bluffs, Ia.

KROME—See Chicago Rawhide Mfg. Co.

LEATHER Tire Goods Co., Niagara Falls, N. Y.
(See page 57.)

LEE Tire & Rubber Co., Conshohocken, Pa.

LEGNARD & Co., A. B., Waukegan, Ill. "Everlasting."

LITTLE GIANT—See Western Tire & Rubber Co.

MATTSON Rubber Co., Lodi, N. J.
(See page 471.)

MESINGER Mfg. Co., H. & F., Austin Pl. & E. 144th St., New York, N. Y.

MICHELIN Tire Co., Milltown, N. J.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MODEL—See Voorhees Rubber Mfg. Co.

NATIONAL Leather Belting Co., 342 E. 38th St., New York, N. Y.

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

NEMO Chemical & Specialty Mfg. Co., 201 Thompson Bldg., Chicago, Ill. "Bull Mooser," "Century."
(See page 131.)

O'NEIL Tire & Protector Co., W. Exchange & Water Sts., Akron, O.

PACIFIC Leather Works, 239 12th St., Oakland, Cal.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

POLSON Bros., Mfg. Co., 331 Southwest Blvd., Kansas City, Mo. "Bull Dog."

RUBBER Goods Supply & Mfg. Co., Akron, O. "Buckeye."

SAVAGE Tire Co., Main & Sicard Sts., San Diego, Cal.

STAR—See Davis Co.

TWENTIETH Century Tire Protector Co., Midlothian, Tex.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

UNIVERSAL Tire Protector Co., Angola, Ind.

UTILITY—See Johnson & Co.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. "Model," "Ideal."
(See page 355.)

WEARWELL Rubber Co., Kokomo, Ind.

WESTERN Tire & Rubber Co., 1701-03 Grand Ave., Kansas City, Mo. "K-C," "Little Giant."

SOAPS

AUTOMOBILE SOAPS

(See also Polishes, Automobile)

AJAX Oil & Grease Co., 170 W. 65th St., New York, N. Y.

ALDING—See Alsten & Goulding Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMALIE—See Sonneborn Sons.

AMBERZO—See Columbia Refining Co.

AMERICAN CROWN—See Kirk & Co.

AMERICAN Oil Co., Jackson, Mich. "Amoco."

AMERICAN Oil & Disinfectant Co., 196 Water St., New York, N. Y.

AMOCO—See American Oil Co.

ARCOLINE—See Atlantic Refining Co.

ARMOUR Soap Works, 31st Pl. & Benson St., Chicago, Ill. "Lustro."

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 129.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ARROW—See Peterson Co.

ATLANTIC Refining Co., Euclid Ave. & E. 65th St., Cleveland O. "Arcoline."

AUTO-KING—See Detroit Soap Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich.

BALKAN—See Jones & Bro.

BANNER Chemical Co., 2301 15th St., Denver, Colo.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BELL Oil Co., 53 E. Ferry St., St. Louis, Mo. "Liberty Bell."

BLUE RIBBON—See International Metal Polish Co.

BUCKEYE—See Davies Co.

CENTURY—See Arnstein, Eugene.

CHAMBERLAIN Co., Sixth Ave. & Grant St., Pittsburg, Pa.

CHARIOT—See Fiske Bros. Refining Co.

CHEMICAL Supply Co., 1565 Merwin St., Cleveland, O.

CINCINNATI Oil Works Co., Cincinnati, O.
(See page 417.)

CLEANEASY—See Winn, Wm. R.

CLENZO—See Puritan Oil Co.

COLGATE & Co., 199 Fulton St., New York, N. Y. "Moto-Gloss."

COLUMBIA Refining Co., 90 West St., New York, N. Y. "Amberzo."

DAVEY & Co., 2600 Grand Ave., Chicago, Ill.

DAVIES Co., J. P., Dayton, O. "Buckeye."

DETROIT Soap Co., Detroit, Mich. "Auto-King."

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DIAMOND Specialty Co., Indianapolis, Ind.

DUPLEX—See Enterprise Oil Co.

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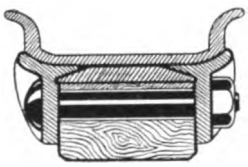
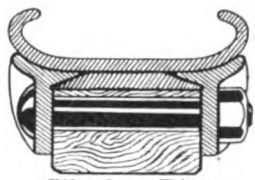
THE FUNK RIM



SS Rim



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SOAPS (Continued)

AUTOMOBILE SOAPS (Continued)

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 129.)

EAGLE Oil & Supply Co., Boston, Mass. "Eoco."
(See page 273.)

EASTERN Supply Co., Hammond & Canterbury Sts., Worcester, Mass.

EAVENSON & Sons, J., Delaware & Penn Sts., Camden, N. J. "Jesco."

ENERGINE Refining & Mfg. Co., The Arcade, Cleveland, O.

ENTERPRISE Oil Co., 164 Chandler St., Buffalo, N. Y. "Duplex."

EOCO—See Eagle Oil & Supply Co.

ERICKA Mfg. Co., 882 Liberty St., Springfield, Mass.

FAIRCHILD & Bro., M. H., 20 W. Michigan St., Chicago, Ill.

FAULTLESS—See Hawkeye Oil Co.

FISK Mfg. Co., Springfield, Mass.

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Chariot."

FORD & DENNEN—See Richmond & Co.

FRAZER Lubricator Co., 3921 Normal Ave., Chicago, Ill.

GENERAL Oil Mfg. Co., Jersey City, N. J.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O.

GREEN LION—See Puritan Soap Co.

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I.

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HERCULES Chemical Works, 2138 W. Van Buren St., Chicago, Ill. "Non-Such."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whizoil."

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

INTERNATIONAL Metal Polish Co., Quill St. & Belt R. R., Indianapolis, Ind. "Blue Ribbon."

INTERSTATE Chemical Co., 12-20 Bayview Ave., Jersey City, N. J.

INVADER Oil Co., 80 Broad St., New York, N. Y.

JESCO—See Eavenson & Sons.

JEWEL—See Wadsworth-Howland Co.

JONES & Bro., J., 429 Locust St., Philadelphia, Pa. "Balkan."

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass.

KIRK & Co., James S., 106 E. Austin Ave., Chicago, Ill. "American Crown."

KLEENU Mfg. Co., 516-24 W. 25th St., New York, N. Y. "Lusteron."

LIBERTY BELL—See Bell Oil Co.

LIN-O—See Strunz & Son.

LOOS & Dilworth, 134 S. Front St., Philadelphia, Pa.

LUSTERON—See Kleenu Mfg. Co.

LUSTRO—See Armour Soap Works.

McLEAN-JONES Oil & Supply Co., 40 India Wharf, Boston, Mass.

MAGIC—See Zurn Co.

MARATHON—See Weinberg & Co.

METEOR—See Narragansett Chemical Co.

MILLER'S Sons, Wm. P., 298-302 Hancock St., Long Island City, N. Y. "Pan-O-Lite."

MILLERS Sons Co., A. D., Columbus & Preble Aves., Pittsburg, Pa. "Perfection."

MOBO—See Stanley, John T.

MODOC Co., Drexel Bldg., Philadelphia, Pa.

MONAHAN Antiseptic Co., 166-72 N. Curtis St., Chicago, Ill. "Simplex."

MONARCH Mfg. Co., Council Bluffs, Ia.

MONOGRAM—See New York Lubricating Oil Co.

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O.

MOTO-GLOSS—See Colgate & Co.

MURPHYS—See Phoenix Oil Co.

NARRAGANSETT Chemical Co., 155-61 Orange St., Providence, R. I. "Meteor."

NATIONAL Oil Products Co., 15 Bergen St., Harrison, N. J.

NATIONAL Oil & Supply Co., 180 Frelinghuysen Ave., Newark, N. J. "Viscos."

NATIONAL Refining Co., Rose Bldg., Cleveland, O.

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram."
(See page 275.)

NON-SUCH—See Hercules Chemical Works.

PAN-O-LITE—See Miller's Sons.

PERFECTION—See Millers Sons Co.

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PHOENIX Oil Co., 2554 W. Fifth St., Cleveland, O. "Murphys."

PIONEER Mfg. Co., 5220 Sweeney Ave., S. E., Cleveland, O. "Shino."

PURE Oil Co., First St. & 13th Ave., S., Minneapolis, Minn. "Puritan."

PURITAN—See Pure Oil Co.

PURITAN Oil Co., 1218 W. 70th St., Cleveland, O. "Clenzo."

PURITAN Soap Co., Rochester, N. Y. "Green Lion."
(See page 361.)

REXINE Co., Sheboygan, Wis.

RICHMOND & Co., C. C., 40 Batterymarch St., Boston, Mass. "Ford & Dennen.

RIE-NIE—See Durkee-Atwood Co.

SHINO—See Pioneer Mfg. Co.

SIMPLEX—See Monahan Antiseptic Co.

SLIKUP—See Arnold, N. B.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SPEARE'S Sons Co., Alden, 140 Sixth St., Boston, Mass.

STANDARD Oil Co. of N. Y., New York, N. Y.

STANLEY, John T., 642 W. 30th St., New York, N. Y. "Mobo."
(See page 361.)

STRUNZ & Son, S., 708 Bingham St., Pittsburg, Pa. "Lin-O."

SULLIVAN Oil Co., 412 Wells St., Chicago, Ill.

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Here is something new in a cleanser for Washing Automobiles.

Puritan Green Lion Cleanser

One ounce is usually sufficient, two ounces will wash the dirtiest car.

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Makers of Cleansers

Rochester, N. Y.

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It is a pure oil soap—containing *no* free alkali—and is so compounded that it not only removes dirt, grease and grime, but at the same time acts as a finish and preservative of varnish. Applied with sponge and water. Packed in 5, 10, 25 and 50 lb. cans. Barrels and half barrels for garages. Write for best dealers' prices.

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WADE MFG. CO.

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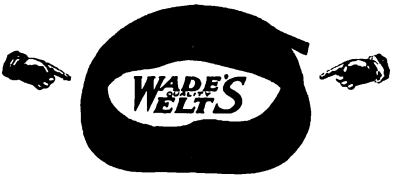

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SOAPS (Continued)

AUTOMOBILE SOAPS (Continued)

TROPICAL Oil Co., W. 70th St. & L. S. & M. S. Ry., Cleveland, O.

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Wang."

VISCOS—See National Oil & Supply Co.

WADSWORTH-Howland Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WANG—See Van Tilburg Oil Co.

WARREN Refining Co., 1137 W. 11th St., Cleveland, O.

WASHZUM—See White & Bagley Co.

WEINBERG & Co., J. H., 128 Maiden Lane, New York, N. Y. "Marathon."

WHITE & Bagley Co., Worcester, Mass. "Washzum." (See Back Cover.)

WHIZOIL—See Hollingshead Co.

WINN, Wm. R., 143 Maiden Lane, New York, N. Y. "Cleaneasy."

YOUNG, Orlando W., 277 Halsey St., Newark, N. J.

ZURN Co., O. F., 2736-38 N. Broad St., Philadelphia, Pa. "Magic."

HAND SOAPS AND PASTES

ALDING—See Alsten & Goulding Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

ARMOUR Soap Works, 31st Pl. & Benson St., Chicago, Ill.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup." (See page 129.)

ARROW—See Peterson Co.

BARRABEE & Jones, 46 Columbus Ave., Boston, Mass. "Nu-Find."

BATES, Howard M., 1034 Fairmount Ave., Philadelphia, Pa. "Grit," "Rite Off."

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston, Mass. "Peerless," "Premium."

CLEAN-PAW—See Frost, F. E.

CLEANEASY—See Winn, Wm. R.

CLEANZUM—See White & Bagley Co.

COLGATE & Co., 199 Fulton St., New York, N. Y.

CORLISS Supply Co., 118 Walnut St., St. Louis, Mo.

DERMALENE—See Northwestern Chemical Co.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie." (See page 129.)

EASTERN Supply Co., Hammond & Canterbury Sts., Worcester, Mass. "Use Me."

EAVENSON & Sons, J., Delaware & Penn Sts., Camden, N. J. "Jesco."

ERICKA Mfg. Co., 382 Liberty St., Springfield, Mass. "Itsafine."

ERICKSON Soap Co., 184-88 Smith St., Hartford, Conn.

FAULTLESS—See Hawkeye Oil Co.

FIEBING Chemical Co., 238-40 Reed St., Milwaukee, Wis. "Presto."

FINGA-BRITE—See Rath Mfg. Co.

FLASH Chemical Co., 9 Fulton Pl., Boston, Mass.

FRAZER Lubricator Co., 3921 Normal Ave., Chicago, Ill.

FROST, F. E., 505 Main St., Worcester, Mass. "Kuick Klean," "Clean-Paw," "Zip."

GIT Mfg. Co., 92 Franklin St., Westfield, Mass.

GRE-SOLVENT—See Utility Co.

GRIM-OFF—See Pitts Sanitary Co.

GRIME-OFF—See Pacific Coast Borax Co.

GRIT—See Bates, Howard M.

HANDY—See Weinberg & Co.

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Krystal Soiloff."

IMP—See Rath Mfg. Co.

ITSAFINE—See Ericka Mfg. Co.

JESCO—See Eavenson & Sons.

JEWEL—See Wadsworth-Howland Co.

KL-ENS-OL—See Northwestern Chemical Co.

KLEENU Mfg. Co., 516-24 W. 25th St., New York, N. Y.

KRYSTAL SOILOFF—See Hollingshead Co.

KUICK-KLEAN—See Frost, F. E.

LAVA—See Waltke & Co.

MIONE Mfg. Co., Collingdale, Pa.

MOBO—See Stanley, John T.

MONAHAN Antiseptic Co., 166-72 N. Curtis St., Chicago, Ill.

MONOGRAM—See New York Lubricating Oil Co.

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram." (See page 275.)

NORTHWESTERN Chemical Co., Marietta, O. "Dermalene," "Kl-Ens-Ol." (See page 129.)

NU-FIND—See Barrabee & Jones.

PACIFIC Coast Borax Co., 100 William St., New York, N. Y. "Grime-off."

PEERLESS—See Blue Ribbon Mfg. Co.

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PITT Sanitary Co., 221½ W. Exchange St., Providence, R. I. "Grim-off."

PREMIUM—See Blue Ribbon Mfg. Co.

PRESTO—See Fiebing Chemical Co.

RADIUM Compound Co., Phoenix, N. Y.

RATH Mfg. Co., Hedley & Richmond Sts., Philadelphia, Pa. "Finga-Brite," "Imp."

REXINI Co., Sheboygan, Wis.

RIE-NIE—See Durkee-Atwood Co.

RITE-OFF—See Bates, Howard M.

SHOFO—See Stanley, John T.

SKAT Co., 791 Park St., Hartford, Conn.

SKIDOO—See Yeazell-Goldstein Corp.

SLIKUP—See Arnold, N. B.

STANLEY, John T., 642 W. 30th St., New York, N. Y. "Shofo," "Mobo." (See page 361.)

TATLOCK Bros., Rochester, N. Y. "Tat's."

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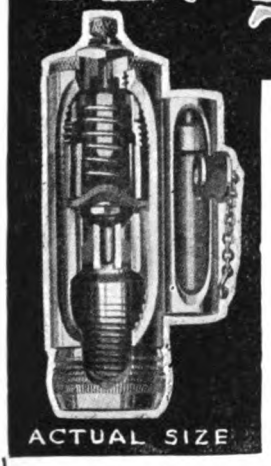
AN AUTOMATIC TIRE SIGNAL



THE POLO TIRE ALARM

A TIRE SAVING DEVICE WHICH HAS RECEIVED THE HIGHEST PRAISE WHEREVER USED OR SEEN.

THE POLO TIRE ALARM is simple, nickel plated, made of brass, replaces valve cap and dust cap, can be attached to any car in two minutes, is indestructible and lasts a life time.

When a tire gets below its required pressure the Alarm gives a shrill whistle which can be heard above all other sounds.

Eighty per cent. of tire expense is said to be due to insufficient pressure. Every tire manufacturer warns against it, yet the motorist is never certain how much pressure he carries.

For $6.00 we send complete SET of four, together with our written guarantee to return full purchase after ten days' trial, if for any reason at all the alarms are not *entirely* satisfactory.

The dealers who are handling THE POLO TIRE ALARM are finding it a splendid seller. Everybody wants this device. Here is your opportunity. Send for our "SPECIAL DEALER'S PROPOSITION" today.

POLO TIRE ALARM COMPANY

930 Great Northern Bldg. CHICAGO

The Index to Quality Cars

BUSH MANUFACTURING CO
HARTFORD CONN.

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SOAPS (Continued)

HAND SOAPS AND PASTES (Continued)

TAT'S—See Tatlock Bros.

USE ME—See Eastern Supply Co.

UTILITY Co., 636 W. 44th St., New York, N. Y. "Gre-Solvent."

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WALTKE & Co., Wm., Grand Ave. & Second St., St. Louis, Mo. "Lava."

WEINBERG & Co., J. H., 128 Maiden Lane, New York, N. Y. "Handy."

WHITE & Bagley Co., Worcester, Mass. "Cleansum." (See Back Cover.)

WINN, Wm. R., 143 Maiden Lane, New York, N. Y. "Cleaneasy."

YEAZELL-GOLDSTEIN Corp., 439 Buttles Ave., Columbus, O. "Skidoo."

ZIP—See Frost, F. E.

SOCKETS

BOW SOCKETS

(For Slat Irons—See Irons, Slat)

AJAX—See Cortland Forging Co.

ASHTABULA Bow Socket Co., Ashtabula, O.

CLEVELAND Hardware Co., Cleveland, O.

CORTLAND Carriage Goods Co., 115 Pt. Watson St., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y. "Ajax."

CRANDAL, Stone & Co., Binghamton, N. Y. "Pioneer." (See page 365.)

DESOCO—See Detroit Socket Co.

DETROIT Forging Co., 120 Mt. Elliott St., Detroit, Mich.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

PANTASOTE Co., 11 Broadway, New York, N. Y. "Solitaire."

PIONEER—See Crandal, Stone & Co.

SCHERER & Co., H., Detroit, Mich.

SOLITAIRE—See Pantasote Co.

ELECTRIC LAMP SOCKETS

ANCHOR—See Metal Specialties Mfg. Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

CONNECTICUT Telephone & Electric Co., Meriden, Conn. (See pages 396A and 396B.)

FRANCO—See Interstate Electric Novelty Co.

GENERAL Electric Co., Schenectady, N. Y.

HANDY—See Chicago Electric Mfg. Co.

INTERSTATE Electric Novelty Co., 29 Park Pl., New York, N. Y. "Franco." (See page 347.)

McCANDLESS & Co., H. W., 67-69 Park Pl., New York, N. Y. (See page 233.)

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Anchor."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

WARNE-DOUGLAS Co., Bronson, Mich.

SOLUTION

PRIMING SOLUTION

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Polar." (See page 445.)

POLAR—See Milwaukee Auto Specialty Co.

QUIXSTART Chemical Co., Providence, R. I.

SPADES

COLLAPSIBLE SPADES AND SHOVELS

BARNARD Specialty Co., 3300 Maple Ave., Los Angeles, Cal.

WAYNESBURG Pressed Steel Co., Waynesburg, Pa.

WOOD Shovel & Tool Co., Piqua, O.

WYOMING Shovel Works, Wyoming, Pa.

SPEEDOMETERS

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

CLEVELAND Speed Indicator Co., W. 114th St. & Locust Ave., Cleveland, O.

CORBIN BROWN—See Corbin Screw Corp.

CORBIN Screw Corp., 219 High St., New Britain, Conn. "Corbin Brown."

DETROIT Instrument Co., 251 E. Jefferson Ave., Detroit, Mich.

EVER READY—See American Ever Ready Co.

FORSE Machine Co., Pendleton, Ind.

GARFORD Mfg. Co., 2515 Taylor St., Elyria, O.

HOFFECKER Co., Motor Mart, Boston, Mass.

JONES Speedometer Co., Bush Terminal, Brooklyn, N. Y.

RECORDING Speedometer Co., Academy St., Newark, N. J.

SEARS-CROSS Co., 19-21 W. 62d St., New York, N. Y. (See page 365.)

STANDARD Thermometer Co., 65 Shirley St., Boston, Mass. (See page 403.)

STAR Speedometer Co., Milton, Pa.

STEWART-WARNER Speedometer Corp., 1904 Diversey Blvd., Chicago, Ill. (See page 365.)

STOVER-LANG Co., 219-23 Columbus Ave., Boston, Mass.

TROY Carriage Sun Shade Co., Troy, O.

VAN Sicklen Co., 58-60 S. River St., Aurora, Ill.

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

Complete Index to Classification appears on Pages 8 to 26.

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Absolutely Accurate

SEARS-CROSS SPEDINDICATOR

The only reasonable indicating instrument for standard equipment. Non-magnetic—not affected by atmospheric conditions or electric light equipments. Purely mechanical.

Accurate. Durable. The only speed indicator strong enough to stand the trip from coast to coast.

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Cincinnati Milwaukee Boston

YESTERDAY TODAY TOMORROW

"PIONEER" BOW SOCKETS maintain their standing as the top-notch of excellence.
Poorly made or badly finished bow sockets ruin in a short time the appearance of an otherwise attractive car.
"PIONEER" BOW SOCKETS insure against such a contingency as they are made in a factory of experts and subjected to the most rigid inspection before they are shipped.
Other "PIONEER" specialties include pressed steel step hangers, curtain fasteners, "Presto" glove fasteners, "Lethermet" nails, prop nuts, etc.

Made in Binghamton, N. Y.,
by

CRANDAL, STONE & CO.

A car is judged by the speedometer it carries.

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Stewart Speedometer
MAGNETIC PRINCIPLE

Stewart-Warner Speedometer Corporation

Executive Offices: 1904 Diversey Blvd., Chicago
Factories: Chicago and Beloit, Wis.

17 Branches. Service Stations in all cities and large towns.

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SPOKES

WIRE SPOKES

NATIONAL Screw & Tack Co., Stanton Ave. & C. & P. Ry., Cleveland, O.

STANDARD Co., Torrington, Conn.

WIRE Goods Co., 28 Union St., Worcester, Mass.

SPONGES

SPONGES AND CHAMOIS

BLOCH & Sons, A., 101 Barclay St., New York, N. Y.

DAVIS & Sons, D., 45 Warren St., New York, N. Y.

FUCHS Co., Max, 244 Pearl St., New York, N. Y.

GREEK-AMERICAN Sponge Co., Franklin & Randolph Sts., Chicago, Ill. (Importers.)

LEVY Bros., 1241 Washington St., Boston, Mass. (Importers.)

NASSAU Sponge Co., 232 W. Lake St., Chicago, Ill.

NATIONAL Sponge & Chamois Co., 158 William St., New York, N. Y. (Importers.)

NIEHAUS Co., Jos., 341 Fourth Ave., W., Cincinnati, O. (Importers.)

SMITH, Kline & French Co., 429 Arch St., Philadelphia, Pa.

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill. (Importers.)

SPRAGS

DROP SPRAGS

(See Brakes, Drop)

SPRINGS

LEAF SPRINGS

ALLOY Steel Spring Co., Jackson, Mich.

AMERICAN Spiral Spring & Mfg. Co., 56th & Butler Sts., Pittsburg, Pa.

ANSTED Spring & Axle Co., Connersville, Ind.

ARMSTRONG Mfg. Co., J. B., Flint, Mich.

B. E. F. Auto Spring Co., 2148 Scranton Rd., Cleveland, O.

BETTS Spring Co., 888 Folsom St., San Francisco, Cal.

BUCKEYE Spring Works, 1919 Race St., Cincinnati, O.

CAMBRIA Spring Co., 913-21 Santee St., Los Angeles, Cal.

CINCINNATI & Hammond Spring Co., 909-23 Summer St., Cincinnati, O.

CLEVELAND-CANTON Spring Co., Canton, O.
(See page 397.)

COOPER Spring Co., Main Ave. & Center St., Cleveland, O.

DELANY & Son, D., Liberty & Hamilton Sts., Newark, N. J.

DETROIT Steel Products Co., 2274 E. Grand Boulevard, Detroit, Mich.
(See page 445.)

GARDEN City Spring Works, 2300 Archer Ave., Chicago, Ill.

HARVEY Spring Co., Box 34, Racine, Wis.
(See page 369.)

HESS-PONTIAC Spring & Axle Co., Pontiac, Mich.
(See page 393.)

HESS Spring & Axle Co., Carthage, O.

HIGGINS Spring & Axle Co., 1314 16th St., Racine, Wis.
(See page 395.)

HUSTON Multiple C Spring Co., Carpenter St., Philadelphia, Pa.

IRON City Spring Co., 2916-26 Smallman St., Pittsburg, Pa.

JENKINS Mfg. Co., 1402 Chestnut St., St. Louis, Mo. "Vulcan."

KALAMAZOO Spring & Axle Co., Portage St., Kalamazoo, Mich.

KEYSTONE Spring Works, 1313 Buttonwood St., Philadelphia, Pa.

KRUPP—See Prosser & Son.

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 135.)

MARBURG Bros., 1790 Broadway, New York, N. Y. (Importers.) "Marburg-Hagen."
(See page 423.)

MARBURG-HAGEN—See Marburg Bros.

MATHER Spring Co., Toledo, O.
(See page 367.)

MERRILL Spring Co., E. R., 530 West 28th St., New York, N. Y.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y.

MITCHELL Spring Works, W. G., Johnstown, Pa.

NATIONAL Spring Co., New Castle, Ind.

PALMER, Jos., 333 Rutherford Ave., Boston, Mass.

PENN Spring Works, Baldwinsville, N. Y.
(See page 454.)

PERFECTION Spring Co., Central Ave. & 65th St., Cleveland, O.
(See page 595.)

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 381.)

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

ROWLAND, Wm. & Harvey (Frankfort), Philadelphia, Pa.

SCRANTON Axle & Spring Co., S. Washington St., Scranton, Pa.

SHELDON Axle Co., Wilkes-Barre, Pa.
(See page 283.)

SPRING Perch Co., Bridgeport, Conn.
(See page 367.)

STANDARD Steel Spring Co., Oliver Bldg., Pittsburg, Pa.

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MATHER SPRING Co.

Mather Springs
ARE
Scientifically Heat-Treated

That means:— GREATER ELASTICITY—
GREATER STRENGTH—
GREATER ENDURANCE—
GREATER UNIFORMITY—
GREATER LIFE—
SATISFACTION!

Genuine made only by

THE MATHER SPRING COMPANY
TOLEDO, OHIO

SPRINGS

of SUPERIOR MANUFACTURE

For PLEASURE and COMMERCIAL VEHICLES

The
Spring Perch Co.

BRIDGEPORT, CONN.

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SPRINGS (Continued)

LEAF SPRINGS (Continued)

TITANIC—See Tuthill Spring Co.

TRIPLE Action Spring Co., 55-61 E. 28th St., Chicago, Ill.

TUTHILL Spring Co., 766 Polk St., Chicago, Ill. "Titanic."
(See page 395.)

VULCAN—See Jenkins Mfg. Co.

WATERTOWN Spring Works, Watertown, N. Y.

WESTERN Spring & Axle Co., 66th St. & Van Kirk Ave., Cincinnati, O.

MACHINERY SPRINGS

AMERICAN Spiral Spring & Mfg. Co., 56th & Butler Sts., Pittsburg, Pa.

AMERICAN Steel & Wire Co. 208 S. La Salle St., Chicago, Ill.
(See page 451.)

BARNES Co., Wallace, Wallace & Parallel Sts., Bristol, Conn.
(See page 397.)

CARY Spring Works, 240 W. 29th St., New York, N. Y.

CHATILLON & Sons, John, 85-93 Cliff St., New York, N. Y.

CLEVELAND Wire Spring Co., Cleveland, O.

COOK Spring Co., 420 E. 106th St., New York, N. Y.

CUYAHOGA Spring Co., 429-35 Prospect Ave., N. W., Cleveland, O.

DUNBAR Bros. Co., Bristol, Conn.

EAGLE—See Miller & Van Winkle.

EUREKA Spring Co., 347 W. Broadway, New York, N. Y.

FISCHER Spring Co., Chas., 88-90 Walker St., New York, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

GARDNER Wire Co., 48 Race Ave., (Austin Station), Chicago, Ill.

GIBSON Co., Wm. D., Huron & Kingsbury Sts., Chicago, Ill.
(See page 471.)

HEBB, George A., 70 William St., Newark, N. J.

HUBBARD Spring Co., M. D., Pontiac, Mich.
(See page 395.)

MILLER Wire Spring Co., Bridgeport, Conn.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y. "Eagle."

MORGAN Spring Co., Worcester, Mass.

NEW Jersey Flexible Shaft & Machine Co., 52-60 Dickerson St., Newark, N. J.

N. Y. Wire & Spring Co., 586-88 Washington St., New York, N. Y.
(See page 395.)

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

RAYMOND Mfg. Co., W. Church St., Corry, Pa.

SABIN Machine Co., Montpelier, Vt.

TUCK Mfg. Co., 74 Ames St., Brockton, Mass.

WEBB Mfg. Co., ft. Center St., Newark, N. J.
(See page 69.)

WILSON, Robert P., 320 Market St., Newark, N. J.

SEAT OR UPHOLSTERY SPRINGS

BARBER Mfg. Co., Anderson, Ind. "Cardinal."
(See page 393.)

BLACK VELVET—See National Spring & Wire Co.

CARDINAL—See Barber Mfg. Co.

CHAMPION—See Wing Co.

CUNARD—See Glasier & Co.

D'ARCY Spring Co., Kalamazoo, Mich.

DEAN & Co., Henry E., 180 Austin Ave., Worcester, Mass.

DETROIT Wire Spring Co., Detroit, Mich.
(See page 369.)

EXCELSIOR—See Trenton Spring & Mattress Co.

FOSTER Bros. Mfg. Co., 137 Broad St., Utica, N. Y.

GIBSON Co., Wm. D., Huron & Kingsbury Sts., Chicago, Ill.
(See page 471.)

GLASIER & Co., A. F., 79 Milk St., Boston, Mass. "Cunard."

JACKSON Cushion Spring Co., Jackson, Mich. "Rough Rider."
(See page 397.)

KELLEY & Co., E., 4 Cherry St., Worcester, Mass.

LACE WEB—See Trenton Spring & Mattress Co.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MILLER Wire Spring Co., Bridgeport, Conn.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y.

MORGAN Spring Co., Worcester, Mass.

MURRAY Spring Co., Wm. A., 132 Sycamore St., Cincinnati, O.

NATIONAL Spring & Wire Co., Albion, Mich. "Black Velvet," "Rocky Road."

ROCKY ROAD—See National Spring & Wire Co.

ROUGH RIDER—See Jackson Cushion Spring Co.

SIMMONS Mfg. Co., Kenosha, Wis.

STAPLES & Hanford Co., Newburgh, N. Y.

TRENTON Spring Mattress Co., Trenton, N. J. "Excelsior," "Lace Web."

VACO—See Vincent-Alward Co.

VINCENT-ALWARD Co., Kenosha, Wis., "Vaco."

WING Co., Charles, Amesbury, Mass. "Champion."
(See page 397.)

SUPPLEMENTARY SPRINGS

(See also Shock Absorbers; also Straps, Rebound)

ACME Torsion Spring Co., 998-1000 Boylston St., Boston, Mass.

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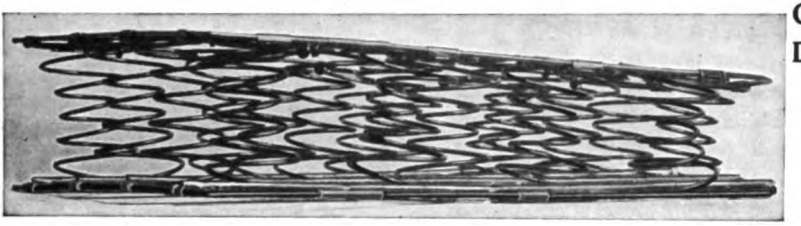


Comfort & Durability

The two great essentials in a Cushion Spring

The Royal Arch Auxiliary Cushion Spring

is a revelation in Comfort and Durability. Bears investigation. Prices and samples sent on request.

DETROIT WIRE SPRING COMPANY, Detroit, Michigan

"OIL-CUSHIONIZE YOUR SPRINGS"

Pat. May 11, '09; Other patents pending

Perfect and **Permanent** lubrication between **the Spring leaves.**

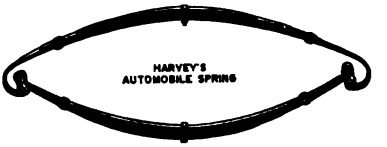
Standard equipment on the **"Borland Electric."**

DANN OIL-CUSHION SPRING INSERT CO.

2246 INDIANA AVE., CHICAGO, ILL.

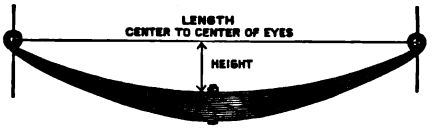
Harvey Auto Springs

All Styles and Shapes Made to Order



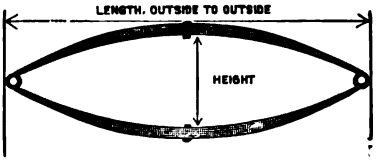
The best that good steel, experience, modern facilities and skilled workmen can make. All springs are tested before leaving the factory and a careful record kept for future reference.

We are glad to give you the benefit of our experience in designing springs for new cars.



The way to measure a Half Spring

Give size of eye bolt and note whether center bolt is in center or out of center. If out of center give length of each end of spring.



The way to measure an Elliptic Spring

Always give the width of the spring, the number of leaves and the combined thickness of the leaves.

It is also well to give make and model of car. If measurements are carefully given we can replace any spring. Prompt attention and reasonable prices.

HARVEY SPRING CO. Box 34 RACINE, WIS.

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SPRINGS (Continued)

SUPPLEMENTARY SPRINGS (Continued)

APCO—See Auto Parts Co.

AUTO Parts Co., 702 Eddy St., Providence, R. I. "Apco."

AXWELL Equipment Co., 421 Wood St., Pittsburg, Pa.

B & R Shock Absorber Co., 11 N. 20th St., Philadelphia, Pa. (See page 353.)

BELMONT—See Standard Auto-Equipment Co.

BLACKLEDGE Mfg. Co., John W., 2110 Michigan Ave., Chicago, Ill. "Velvet."

BRESLER-WALLACE Sales Co., 1031 Dime Bank Bldg., Detroit, Mich. (See page 329.)

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y. "Eclipse."

COMFORT Shock Absorber Co., Hempstead, N. Y.

COX Brass Mfg. Co., Albany, N. Y. "Coxajusto." (See page 511.)

COXAJUSTO—See Cox Brass Mfg. Co.

ECLIPSE—See Brown Co.

E-Z Rider—See Forest City Electric Co.

F-F—See France Mfg. Co.

FALKENHAINER & Co., 313 Carr St., St. Louis, Mo. "Ri-D-Z."

FLEX—See Wallace Supply Co.

FOREST City Electric Co., 5003 Windsor Ave., Cleveland, O. "E-Z Rider." (See page 371.)

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

FRANCE Mfg. Co., 1434 W. 75th St., Cleveland, O. "F-F."

HALLADAY Co., L. P., Streator, Ill.

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J. (See page 353.)

HASSLER, Robert H., W. Tenth & Canal Sts., Indianapolis, Ind.

HAYES Shockless Spring Co., Monongahela, Pa.

HEADLIGHT Support Co., 728 Woodward Ave., Detroit, Mich.

J. M. Shock Absorber Co., 210 S. 17th St., Philadelphia, Pa.

JOHNSON—See Triple Action Spring Co.

KEYSTONE Shock Absorber Co., 1216-18 Liverpool St., N. S., Pittsburg, Pa.

KEYSTONE Spring Works, 1313 Buttonwood St., Philadelphia, Pa. "Simflex."

NATIONAL Shock Absorber Co., 1401 Scribner Ave., N. W., Grand Rapids, Mich. (See page 509.)

PALMER Gauge Co., Dwight Bldg., Jackson, Mich.

POLLEYS Pneumatic Cylinder Co., 101 Concord Ave., Cambridge, Mass.

POWERS Spring Co., 239-41 W. 56th St., New York, N. Y. (See page 371.)

REX—See Volute Spring Shock Absorber Co.

RI-D-Z—See Falkenhainer & Co.

ST. LOUIS Supplementary Spiral Spring Co., 4523 Delmar Ave., St. Louis, Mo.

SIMPLEX—See Keystone Spring Works.

SMITH, H. Lund, 199-203 Paterson St., Paterson, N. J.

STANDARD Auto-Equipment Co., 4947 Fairmount Ave., Philadelphia, Pa. "Belmont."

TRIPLE Action Spring Co., 55-61 E 28th St., Chicago, Ill. "Johnson."

VELVET—See Blackledge Mfg. Co.

VOLUTE Spring Shock Absorber Co., Mt. Vernon, N. Y. "Rex."

WALLACE Supply Co., 412-20 Orleans St., Chicago, Ill. "Flex."

TOP STRAP SPRINGS

BON Mfg. Co., Elgin, Ill. "Elgin."

ELGIN—See Bon Mfg. Co.

SPROCKETS

MACHINED SPROCKETS

(For Sprocket Blanks—See Castings; also Forgings; also Gears, Blank)

BALDWIN Chain & Mfg. Co., Worcester, Mass. (See page 241.)

BILLINGS & Spencer Co., Hartford, Conn.

BOSTON Gear Works, Norfolk Downs, Mass. (See page 313.)

CROWN—See Great Western Mfg. Co.

CULLMAN Wheel Co., 1352 Greenwood Terrace, Chicago, Ill. (See page 181.)

DIAMOND Chain & Mfg. Co., 231 W. Georgia St., Indianapolis, Ind.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 527.)

FORG, Peter, 50 Park St., Somerville, Mass.

GREAT Western Mfg. Co., Laporte, Ind. "Crown."

MUNCIE Gear Works, Muncie, Ind.

NEW England Gear Works, 100 Purchase St., Boston, Mass.

PARISH & Bingham Co., Cleveland, O. (See page 171.)

PENNSYLVANIA Gear Works, 437 N. Broad St., Philadelphia, Pa.

RUSSEL Wheel & Foundry Co., Detroit, Mich.

SIER-BATH Co., 143 W. 54th St., New York, N. Y. (See page 475.)

STAMPINGS

STEEL STAMPINGS

ACKLIN Stamping Co., Toledo, O.

ADVANCE Machinery Co., 517-29 Hamilton St., Toledo, O.

ADVANCE Mfg. Co., Racine, Wis. (See page 467.)

AJAX Plating & Specialty Mfg. Co., 371 Seventh St., Buffalo, N. Y.

Complete Index to Classification appears on Pages 8 to 26.

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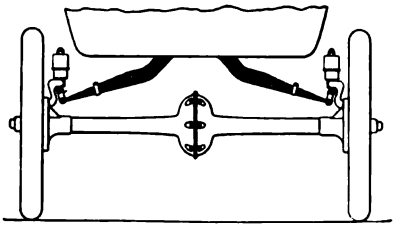
FORD OWNERS AND DEALERS



Here's a Real Shock Absorber—Guaranteed for One Year

and price is within the reach of everybody. The Ford owner gets more actual value for the purchase price than ever before offered. You receive the benefit of a high grade shock absorber at a price that fits the Ford Owner's pocketbook. Write for information and instructions for applying. Money refunded if not satisfactory after ten days.

SAVE YOUR TIRES
GIVE MORE SPEED
SAVE WEAR AND TEAR
ELIMINATE VIBRATION
MAKE ALL ROADS SMOOTH

Save continual tightening of nuts and bolts

ELY SHOCK ABSORBER
FOR FORD CARS

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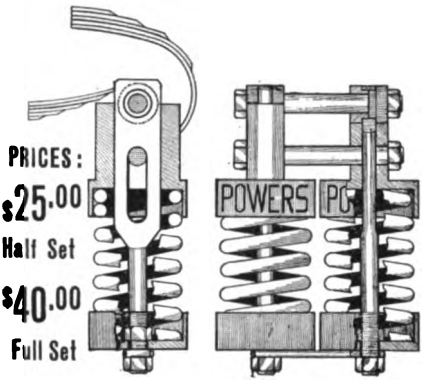
Made of Chrome-Vanadium Dropped Forgings.

$12.50 per set of four, $7.00 per set of two

DEALERS—

Write for our Special Price on Quantity Orders

Donnelly Motor Equipment Co.
MANUFACTURERS
1779 Broadway New York, N. Y.



POWERS SHOCK ABSORBERS

Mfg. by Powers Spring Co.

239-241 W. 56th St., New York City

Powers Shock Absorbers are made to attach to the back end of the front springs as well as the back end of the rear springs. A perfectly accessible absorber that will meet the demands of you as a dealer.

POWERS SPRING CO.

239-241 W. 56th St., New York, N.Y.

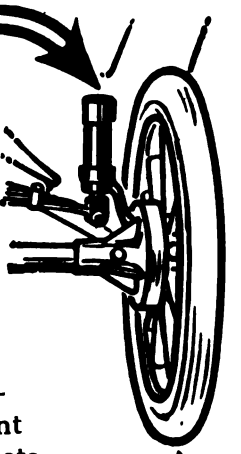
Mr. Dealer:

We call your attention to

E-Z RIDER SHOCK ABSORBER (TRADE MARK)

for Ford cars. We furnish free to you metal signs in colors, circulars with your name imprinted thereon, electros for local advertising purposes, advertising slides for moving picture shows, and you get the benefit of our broad publicity campaign, besides a very liberal discount from the selling price, which nets you a handsome profit in handling our

E-Z RIDER SHOCK ABSORBER. (TRADE MARK)



Forest City Electric Co.

5003 Windsor Ave. Cleveland, Ohio

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STAMPINGS (Continued)

STEEL STAMPINGS (Continued)

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 247.)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BAY STATE Stamping Co., 380 Chandler St., Worcester, Mass.

BETTCHER Mfg. Co., Cleveland, O.

BLAIR Tool & Machine Works, 521 Greenwich St., New York, N. Y.

BOSSERT Co., Utica, N. Y.
(See page 217.)

BOSTON Pressed Metal Co., 171-78 Union St., Worcester, Mass.

BOWEN Mfg. Co., Auburn, N. Y.
(See page 149.)

BREGWOODKRO Stamping & Mfg. Co., Lorain, O.

BRIDGEPORT Metal Goods Mfg. Co., Howard Ave. & Spruce St., Bridgeport, Conn.

BRISCOE Mfg. Co., Detroit, Mich.

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

BURNS & Bassick Co., Bridgeport, Conn.
(See page 275.)

BURR Mfg. Co., 2108 Superior Ave., N. W., Cleveland, O.

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CONSOLIDATED Mfg. Co., Toledo, O.

CROSBY Co., Buffalo, N. Y.
(See page 539.)

CROWE Name Plate & Engraving Co., Chicago, Ill.
(See page 291.)

CUSTER Coupling Co., Bradford, Pa.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 219.)

DIAMOND Mfg. Co., Detroit, Mich.

DISSTON & Sons, Henry, (Tacony), Philadelphia, Pa.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 527.)

EASTERN Machine & Stamping Co., 15 Wickenden St., Providence, R. I.

ENGLAND Mfg. Co., 1559 Jefferson Ave., W., Detroit, Mich.

ERIE Stamping & Mfg. Co., 644-48 W. 12th St., Erie, Pa.

EVERETT Mfg. Co., 162-64 N. May St., Chicago, Ill.

FANNER Mfg. Co., Brookside Pk., Cleveland, O.

FARIES Mfg. Co., Decatur, Ill.

FEDERAL Pressed Steel Co., Milwaukee, Wis.
(See page 291.)

FORG, Peter, 50 Park St., Somerville, Mass.

FORSYTH Bros. Co., Harvey, Ill.

FORT DEARBORN Mfg. Co., 1574-80 Crossing St., Chicago, Ill.

FRIES & Co., Buffalo, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 87.)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

GEM Stamped Steel Co., Everett Ave. & Blvd., (Chelsea Station), Boston, Mass.

GEUDER, Paeschke & Frey Co., 100 15th St., Milwaukee, Wis.

GIER & Dail Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 81.)

GREER, Fredric, 525 W. Van Buren St., Chicago, Ill.

HARDY Mfg. Co., Pendleton, Ind.
(See page 163.)

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HAYES-IONIA Co., Ionia, Mich.

HERO Mfg. Co., Gaul & Adams Sts., Philadelphia, Pa.

HILL Co., Geo. Q., 32-34 Dorchester Ave., Boston, Mass.

HOEFT & Co., Ashland Ave. & Kinzie St., Chicago, Ill.

HOLIHAN Mfg. Co., 21st & Jefferson Sts., Detroit, Mich.

HOUGHTON Mfg. Co., 81-89 Exchange St., Worcester, Mass.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O.
(See page 157.)

INDIANAPOLIS Tool & Mfg. Co., Indianapolis, Ind.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

JANNEY, Steinmetz & Co., Philadelphia, Pa.
(See page 399.)

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

KICKHAEFER Mfg. Co., 199-201 Oregon St., Milwaukee, Wis.

KINSEY Mfg. Co., Toledo, O.

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O.

LINDHOLM Metal Stamping Co., 107-15 Erie St., Camden, N. J.
(See page 149.)

McDOWELL Mfg. Co., 541 Wood St., Pittsburg, Pa.
(See page 427.)

MASSACHUSETTS Machine Shop, 100 Beacon St., Worcester, Mass.

MATHEWS Mfg. Co., H. A., Seymour, Conn

MATTHEWS Mfg. Co., Worcester, Mass.

METAL Specialty Co., Cincinnati, O.

METROPOLITAN Mfg. Co., 12th St., & G. T. R. R., Detroit, Mich.

Complete Index to Classification appears on Pages 8 to 26.

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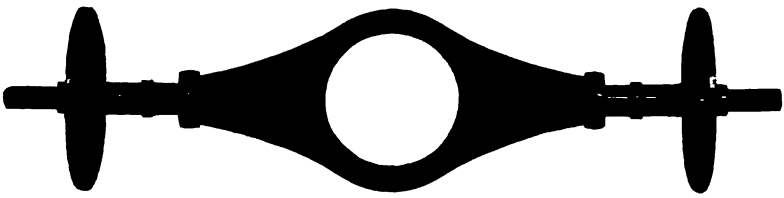
PRESSED STEEL

Rear Axle Housings



Note the **Beaded** or **Folded Seam,** which acts as an integral truss. This construction is more rigid and of better appearance than either the welded or cast housings. We are particularly interested in large quantity requirements of Housings with Assembled Fittings.

PRESSED STEEL FRAMES

We are the **Pioneers** in this field and have unequalled facilities. We combine **Quality** with **Delivery Service** and can give you absolute assurances of both.

DROP FORGINGS

Our equipment ranges from 1,000-lb. to 16,000-lb. hammers. We can offer you a **reliable** source of supply.

Our own Chemical and Physical Laboratories and Heat Treating Department gives us superior advantages for Frame and Drop Forge Work.

"A Smith Frame is a Perfected Pressed Steel Frame"

A. O. SMITH COMPANY

Milwaukee

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STAMPINGS (Continued)

STEEL STAMPINGS (Continued)

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE Pressed Steel Co., East Moline, Ill.

MOORE & Co., 301 W. Grand Ave., Chicago, Ill.

MORGAN Spring Co., Worcester, Mass.

MOSSBERG Co., Frank, Attleboro, Mass.
(See page 553.)

NATIONAL Stamping & Electric Works, 415-26 Clinton St., Chicago, Ill.

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn.
(See page 545.)

NEWARK Stamping Co., Newark, O.
(See page 551.)

OAKES Pressed Steel Co., Indianapolis, Ind.

PARISH Mfg. Co., Reading, Pa.
(See page 483.)

PARISH & Bingham Co., Cleveland, O.
(See page 171.)

PARKER White Metal & Machine Co., Erie, Pa.
(See page 321.)

QUINSIGAMOND Pressed Steel Co., 62 Jackson St., Worcester, Mass.

R. P. K. Pressed Metal Co., 331 Madison Ave., New York, N. Y.

RAMSDELL Specialty Co., W. Boylston St., Worcester, Mass.

ROCHESTER Pressed Steel Co., 16 Commercial St., Rochester, N. Y.

ROYAL Enameling & Mfg. Co., 336 W. Madison St., Chicago, Ill.

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y.
(See page 507.)

S. & I. Co., 53-55 Governor St., Springfield, Mass.

SCHATZ Mfg. Co., 17 Fairview Ave., Poughkeepsie, N. Y.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SESSIONS & Son, J. H., Bristol, Conn.

SMITH Co., A. O., Milwaukee, Wis.
(See page 373.)

SMITH Co., Thomas, 13 Cypress St., Worcester, Mass.

SPAFFORD Tool Works, 32 Union Pl., Hartford, Conn.

SPECIAL Machine Co., 184 John St., Bridgeport, Conn.

STANDARD Mfg. Co., 990 Housatonic Ave., Bridgeport, Conn.

STANDARD Steel Box Co., Bridgeville, Pa.

STANDARD Tool & Mfg. Co., 72 Champlain St., Detroit, Mich.

STANLEY Works, New Britain, Conn.

STEARNS Stamping Co., W. H., 34 Southbridge St., Worcester, Mass.

SUPERIOR Lamp Mfg. Co., 136 W. 52d St., New York, N. Y.

SUPERIOR Metal Products Co., Elyria, O.

SYRACUSE Stamping Co., 1056 S. Clinton St., Syracuse, N. Y.

TRANSUE & Williams Co., W. Ely St., Alliance, O.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

VOELKNER & Harry Mfg. Co., 282-92 Woodbridge St., E., Detroit, Mich.

VOGEL & Bros., Wm., Brooklyn, N. Y.

W. & S. Mfg. Co., 9 Hunt St., Worcester, Mass.

WALKER-WELLS Co., Amesbury, Mass.

WILCOX Co., W. W., 1713-35 Armitage Ave., Chicago, Ill.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

XARDELL Bros. Co., 28 Broadway, Utica, N. Y.

STANDS

WASH STAND LIGHT STANDS

(See Lights, Wash Stand)

STARTERS

ACETYLENE GAS ENGINE STARTERS

ACME—See Sheer Co.

COX Brass Mfg. Co., Albany, N. Y. "Crankless."
(See page 511.)

CRANKLESS—See Cox Brass Mfg. Co.

CRARY—See T. C. F. Mfg. Co.

CUNO Engineering Corp., 80 S. Vine St., Meriden, Conn.

HOME Light Co., 2108 Dayton St., Chicago, Ill. "U. S."

INVINCIBLES Starter Co., Penobscot Bldg., Detroit, Mich.

METEOR Auto Tank Co., 1666 Broadway, New York, N. Y.

MONTROY Ignition Starter Co., Coahoma, Miss.

POLSON Mfg. Co., 27 Chenango St., Buffalo, N. Y.

PREST-O-LITE Co., 1400 Speedway, Indianapolis Ind.
(See page 509.)

REKAR Automatic Starter Co., David Hewes Bldg., San Francisco, Cal.

SHEER Co., H. M., Quincy, Ill. "Acme."

T.A.D.—See Toledo Auto Devices Co.

TATE—See United Motor Equipment Co.

TIMME, A. F., 315 Mineral St., Milwaukee, Wis.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

U. S.—See Home Light Co.

UNITED Motor Equipment Co., 19 S. La Salle St., Chicago, Ill. "Tate."

VIM Mfg. Co., Clark Ave. & 61st St., Cleveland, O.

Complete Index to Classification appears on Pages 8 to 26.

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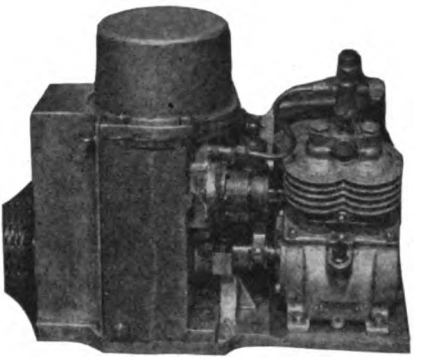
Compton Air Starter

Powerful—Reliable

Will Start an Explosive Engine every minute in the hour—every hour in the day.



To Start Press the Button—That is all
Air Pressure Maintained Automatically
Nothing to Remember—Nothing to Forget

"Compton System Starts Cars as Easily as Air Brakes Stop Trains."

"Marvel of Simplicity."

"Adaptable to All Cars and is Controlled by Slight Pressure on Button."—*Philadelphia Record.*

American Motor Utilities Co.

Singer Building NEW YORK

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STARTERS (Continued)

COMPRESSED AIR ENGINE STARTERS

AMERICAN Motor Utilities Co., Singer Bldg., New York, N. Y. "Compton.." (See page 375.)

AUTO Air Appliance Co., Industrial Bldg., Baltimore, Md. "Crouse."

AUTO Air-Rotor Co., 10 Garden St., Auburn, N. Y.

CHRISTENSEN Engineering Co., 841-47 30th St., Milwaukee, Wis.

COMPTON—See American Motor Utilities Co.

CRESCENT Co., 1199 Woodward Ave., Detroit, Mich.

CROUSE—See Auto Air Appliance Co.

GEMMER-DETROIT Starter Co., Ford Bldg., Detroit, Mich.

GOODWIN & Miles Co., San Francisco, Cal.

HAM-MEIX Mfg. Co., W. 11th St. & Belt Railroad, Indianapolis, Ind. "H & M."

H & M—See Ham-Meix Mfg. Co.

JANNEY, Steinmetz & Co., Philadelphia, Pa. (See page 399.)

KELLOGG Mfg. Co., Rochester, N. Y. (See page 527.)

KILGORE Motor Starter Co., Barrister's Hall, Boston, Mass.

LIPMAN Air Appliance Co., Beloit, Wis.

LOMBARD Mfg. Co., Cutler Bldg., Rochester, N. Y.

MANZEL Bros. Co., 320 Babcock St., Buffalo, N. Y. (See page 317.)

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich. "Thurber."

ROTH-MURPHY Engine Starter Co., Lemcke Bldg., Indianapolis, Ind.

SHIMPF Starter Co., 178 Devonshire St., Boston, Mass.

SMITH, Irvin C., 925 Santee St., Los Angeles, Cal.

STANDARD Appliance Co., Franklin, Pa.

STEVENS Mfg. & Supply Co., Fischer Bldg., Chicago, Ill.

THURBER—See Northern Engineering Wks.

ELECTRIC ENGINE STARTERS

ADAMS-BAGNALL Electric Co., Cleveland, O.

ADAMS & Westlake Co., Chicago, Ill. "Adlake." (See page 209.)

ADLAKE—See Adams & Westlake Co.

ALLIS-CHALMERS Mfg. Co., Milwaukee, Wis.

APELCO—See Apple Electric Co.

APPLE Electric Co., Newark, N. J. "Apelco."

AUTO-LITE—See Electric Auto-Lite Co.

BIJOU Motor Lighting Co., 15th St. & River Front, Hoboken, N. J.

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

BRIGGS Magneto Co., Elkhart, Ind.

DAYTON-DICK Co., Quincy, Ill.

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."

DEACO—See Detroit Electric Appliance Co.

DELCO—See Dayton Engineering Laboratories Co.

DETROIT Electric Appliance Co., 264-68 Jefferson Ave., Detroit, Mich. "Deaco."

DETROIT Starter Co., 940 Jefferson Ave., E., Detroit, Mich.

DYNETO Electric Co., Syracuse, N. Y., "Entz." (See page 377.)

ELECTRIC Auto-Lite Co., Toledo, O. "Auto-Lite." (See page 159.)

ELECTRIC Generator & Accumulator Co. of America, 1120 W. 35th St., Chicago, Ill. "Elgenac."

ELECTRICAL Engineering & Storage Battery Co., Hume-Mansure Bldg., Sandy Hook, Conn. "Integral."

ELGENAC—See Electric Generator & Accumulator Co. of America.

EMERSON Electric Mfg. Co., 2024-32 Washington Ave., St. Louis, Mo.

ENTZ—See Dyneto Electric Co.

ESTERLINE Co., 228 E. South St., Indianapolis, Ind.

FISHER Electrical Works, 2000 Larned St., W., Detroit, Mich. (See page 347.)

FLANDERS Co., Woodward & Warren Aves., Detroit, Mich. "Uno."

GRAY & Davis, Boston, Mass. (See page 231.)

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J. (See page 353.)

HOLT Electric Co., 377 S. Pierce St., Milwaukee, Wis.

INST Lighter Co., 59 E. Main St., Columbus, O.

INTEGRAL—See Electrical Engineering & Storage Battery Co.

JENNEY Electric Corp., Canal & Tenth Sts., Indianapolis, Ind.

JESCO—See Jones Electric Starter Co.

JONES Electric Starter Co., 1401 W. Jackson Blvd., Chicago, Ill. "Jesco."

KEMCO Electric Mfg. Co., 2229 Ashland Rd., Cleveland, O.

L-N—See Leece-Neville Co.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L-N."

LEONARD Electric Co., Ward, Bronxville, N. Y.

LOMBARD Mfg. Co., Cutler Bldg., Rochester, N. Y.

M. R. T. Electric Light & Starter Co., Des Moines, Ia.

MAXIMUM Electrical Co., 264-68 Jefferson Ave., E., Detroit, Mich.

NORTH East Electric Co., Rochester, N. Y. (See page 531.)

OTHO Motor Co., 45 Milk St., Boston, Mass.

PARIS Electric Starter Co., Paris, Ill.

REMY Electric Co., Anderson, Ind. (See page 253.)

Complete Index to Classification appears on Pages 8 to 26.

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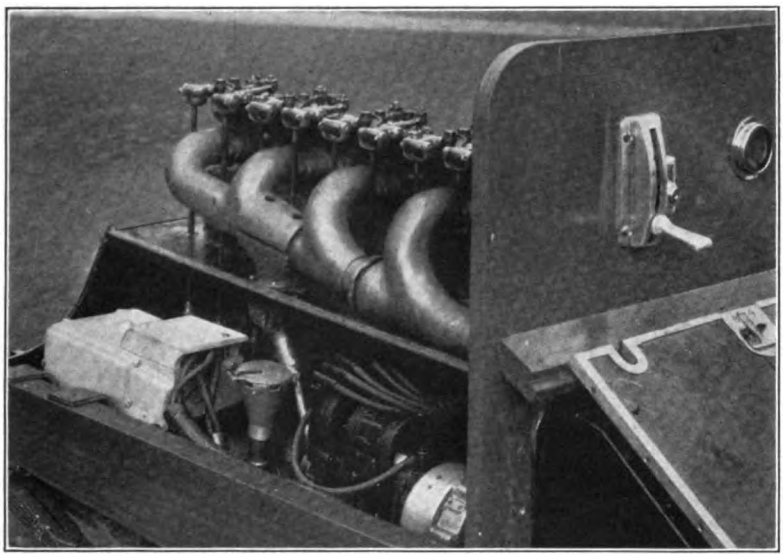
=DYNETO-ENTZ=

ELECTRIC STARTER

AND LIGHTING SYSTEM



SIMPLE
STURDY
ACCESSIBLE
SINGLE-UNIT
SYSTEM

Switch shown above is only control used

One switch; simply throw it on; that's all

The Dyneto-Entz is the most simplified system for lighting and starting. It consists of a single unit that acts as generator and motor.

The change from generator to motor is done without the aid of automatic devices or any attention on the part of the driver. It is the natural function of the type of mechanism used. The direction of the current is controlled by the speed of the armature through its magnetic fields.

Prevents Stalling

When the speed of the engine reduces to a point where it is liable to stall, its revolutions are assisted by the motor and as soon as engine picks up again the assistance from motor ceases, changing the motor to a generator. Battery is so constructed that it cannot be injured by overcharging, doing away with complicated automatic cutouts.

Only one switch—simply throw it on, it is not touched again until you want to stop engine. Adopted by the White Co., and the Franklin Mfg. Co. Illustration on this page shows Entz generator on Franklin Six.

Write for full particulars.

Can be easily installed on cars in use.

THE DYNETO ELECTRIC CO.

SYRACUSE, N. Y.

SALES AGENT:—T. J. Wetzel, 17 W. 42d Street, New York City

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STARTERS (Continued)

ELECTRIC ENGINE STARTERS (Continued)

RUSHMORE Dynamo Works, Plainfield, N. J. (See page 433.)

SAMSON Engineering Co., Louisville, Ky.

U-S-L—See U. S. Light & Heating Co.

U. S. Light & Heating Co., Niagara Falls, N. Y. "U-S-L." (See page 389.)

UNO—See Flanders Co.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WELLS Mfg. Co., R. C., Fond du Lac, Wis.

WESTINGHOUSE Electric & Mfg. Co. (East Pittsburg), Pittsburg, Pa.

GASOLINE OR VAPOR ENGINE STARTERS

(For Priming Devices—See Primers; Gasoline Engines

AURORA Vulcan Co., Security Bldg., Bridgeport, Conn.

AUTOMATIC Starter Co., 418 N. Third St., St. Louis, Mo.

BROWN-MADDOCK Co., West Newbury, Mass.

LIEBSON Self-Starter Co., Georgia Life Bldg., Macon, Ga.

MARKHAM Co., W. D., Clarksdale, Miss.

MANUAL OR PEDAL OR LEVER ENGINE STARTERS

(See also Cranks, Safety Starting)

AUTOMATIC Appliance Co., 172 Columbus Ave., Boston, Mass. "Boston." (See page 379.)

B. H. D.—See Specialties Sales Co.

BOSTON—See Automatic Appliance Co.

BREMER-WILSON Mfg. Co., 1421 Michigan Ave., Chicago, Ill. "Triplex."

CENTURY Foundry Co., 1622 N. Salina St., Syracuse, N. Y. "Housel."

CLARK Crank Co., Johnson Bldg., Muncie, Ind.

GAHM Mfg. Co., Streator, Ill.

GLENARD—See National Motor Device Co.

HOME Light Co., 2108 Dayton St., Chicago, Ill.

HOUSEL—See Century Foundry Co.

KNAPP Bros. Starter & Equipment Co., 24th & Central Aves., Minneapolis, Minn.

MISSOURI Sales Co., St. Louis, Mo.

MOGUL Starter Co., 1323 Michigan Ave., Chicago, Ill.

NATIONAL Motor Device Co., 3901 Ellis Ave., Chicago, Ill. "Glenard."

OVERHOLT Co., S. Henderson & Fourth Sts., Galesburg, Ill. "Over-Turn."

OVER-TURN—See Overholt Co.

PERFECTION Auto Starter Co., 1551 Broadway, Denver, Colo.

SANDBO Starter Co., Rock Island, Ill.

SIMPLEX Sales Co., Union Bldg., Anderson, Ind.

SPECIALTIES Sales Co., Kansas City, Mo. "B. H. D."

TRIPLEX—See Bremer-Wilson Mfg. Co.

UNIVERSAL Mfg. Co., Racine, Wis. (See page 243.)

MECHANICAL OR SPRING ENGINE STARTERS

AMERICAN Ever Ready Co. 316 Hudson St., New York, N. Y. "Ever Ready."

AUTOMATIC Devices Co., Galesburg, Ill. "Startzer."

DENVER Ford Starter Co., Denver, Colo.

ELDER Mfg. Co., 2305 N. Illinois St., Indianapolis, Ind.

EVER READY—See American Ever Ready Co.

GARDNER Engine Starter Co., 1451-55 Michigan Ave., Chicago, Ill.

MESNARD—See Modern Auto Starter Co.

MODERN Auto Starter Co., 1505 S. Michigan Ave., Chicago, Ill. "Mesnard."

STARTZER—See Automatic Devices Co.

TUDOR, J. W., 35 Congress St., Boston, Mass.

STEEL

DEALERS IN STEEL

(This is a List of Dealers in Iron, Steel and other metals who advertise in this publication)

HARVEY Co., Arthur C., 374 Congress St., Boston, Mass. (See page 387.)

MORRIS & Co., E. K., 311-17 W. Second St., Cincinnati, O. (See page 427.)

ANGLE, CHANNEL AND TEE IRON OR STEEL

CAMBRIA Steel Co., Johnstown, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

ILLINOIS Steel Co., 203 S. La Salle St., Chicago, Ill.

INLAND Steel Co., First National Bank Bldg., Chicago, Ill.

JONES & Laughlin Steel Co., Pittsburg, Pa.

LOCKHART Iron & Steel Co., McKees Rocks, Pa. "Vulcan."

LOGAN Iron & Steel Co., 1421 Chestnut St., Philadelphia, Pa.

PENNSYLVANIA Steel Co., Morris Bldg., Philadelphia, Pa. (See page 383.)

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

VULCAN—See Lockhart Iron & Steel Co.

Complete Index to Classification appears on Pages 8 to 26.

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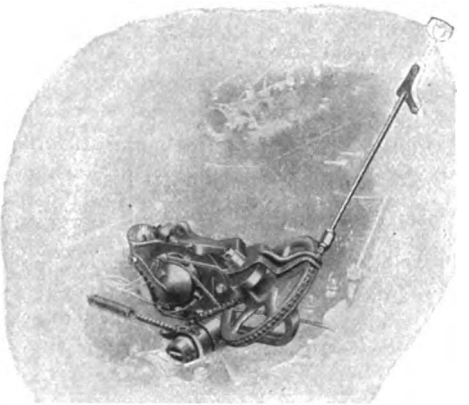
BOSTON STARTER

For Ford Automobiles

MODEL "T"

A Mechanical Device That Starts the Motor from the Driver's Seat.



Automatically Retards the Spark and Releases in Case of Backfire

Boston Starter Assembled on Car with Fan and Radiator Removed

Does not interfere with the regular Starting Crank.
Is completely concealed under the hood, except the handle.
Any one can attach it to his own car.

Write for further particulars.

Manufactured by

AUTOMATIC APPLIANCE CO.

172 Columbus Ave., Boston, Mass.

DISTRIBUTED BY

Portland, Oregon,
S. G. Morrison,
708 Morgan Building.

Baltimore, Md.,
Robert W. Butler,
4529 Park Heights Ave.

Schenectady, N. Y.,
Dorp Auto Company,
307 State Street.

Detroit, Mich.,
Wilson-Schroeter Agency,
1249 Woodward Avenue.

South Boston, Va.,
Barbour-Wilborn Hdw. Co.

Los Angeles, Cal.,
J. R. Bradford,
1044 South Olive St.

Newark, N. J.,
Ford Specialty Co.,
10 Bleecker St.

Seattle, Wash.,
L. E. Miller,
723 East Pike Street.

Louisville, Ky.,
Boston Starter Company
of Kentucky.

Syracuse, N. Y.,
F. W. Fischer,
111 East Corning Ave.

Denver, Colo.,
Bert E. Clark,
1616 Broadway.

Providence, R. I.,
William Burton,
103 Bradford Street.

Buffalo, N. Y.,
Frank X. Irr,
253 Allen Street.

Richmond, Va.,
Chemi Company.

Iowa Falls, Iowa,
Stiles & Lansing.

Automobile Sundries Co.
(Sole distributors for export)
18 Broadway,
New York, N. Y.

Reliable Distributors for Unoccupied Territory Wanted

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STEEL (Continued)

BAR IRON OR STEEL

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

BALDWIN Steel Co., Charleston, W. Va.

CAMBRIA Steel Co., Johnstown, Pa.

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

ILLINGSWORTH Steel Co., John (Frankford), Philadelphia, Pa.

ILLINOIS Steel Co., 203 S. La Salle St., Chicago, Ill.

INLAND Steel Co., First National Bank Bldg., Chicago, Ill.

JONES & Laughlins Steel Co., Pittsburg, Pa.

KRUPP—See Prosser & Son.

LACKAWANNA Steel Co., Buffalo, N. Y.

LOCKHART Iron & Steel Co., McKees Rocks, Pa. "Vulcan."

LOGAN Iron & Steel Co., 1421 Chestnut St., Philadelphia, Pa.

PARDEE Works, C., Perth Amboy, N. J.

PENNSYLVANIA Steel Co., Morris Bldg., Philadelphia, Pa.
(See page 383.)

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 381.)

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

UNITED Steel Co., Canton, O.
(See page 385.)

VULCAN—See Lockhart Iron & Steel Co.

SHEET STEEL

ALLEGHENY Steel Co., Brackenridge, Pa.

AMERICAN Rolling Mill Co., Middletown, O. "Middletown."

AMERICAN Sheet & Tin Plate Co., Frick Bldg., Pittsburg, Pa.

CARNAHAN Tin Plate & Sheet Co., Canton, O.

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

FOLLANSBEE Bros. Co., Third & Liberty Aves., Pittsburg, Pa.

INLAND Steel Co., First National Bank Bldg., Chicago, Ill.

KRUPP—See Prosser & Son.

LA BELLE Iron Works, Steubenville, O.

McVOY Sheet & Tin Plate Co., 344-50 W. Michigan St., Chicago, Ill.

MASSILLON Rolling Mill Co., Massillon, O.

MIDDLETOWN—See American Rolling Mill Co.

PARKERSBURG Iron & Steel Co., Parkersburg, W. Va.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 381.)

TAYLOR Co., N. & G., Chestnut & Third Sts., Philadelphia, Pa.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

COLD ROLLED BAR STEEL

CAMBRIA Steel Co., Johnstown, Pa.

COLUMBIA Steel & Shafting Co., Pittsburg, Pa.

COMPRESSED Steel Shafting Co., 393 Dorchester Ave., Boston, Mass.

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

CUMBERLAND Steel Co., Williams St. & B. & O. R. R., Cumberland, Md.

FITZSIMONS Co., Youngstown, O.

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi."
(See page 219.)

JONES & Laughlins Steel Co., Pittsburg, Pa.

KRUPP—See Prosser & Son.

NEW Process Steel Corp., Lancaster, Pa.

PARDEE Works, C., Perth Amboy, N. J.

PITTSBURG Shafting Co., of Detroit, Detroit, Mich.

POLDI—See Frasse & Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 381.)

UNION Drawn Steel Co., Beaver Falls, Pa.
(See page 387.)

UNITED Steel Co., Canton, O.
(See page 385.)

COLD ROLLED STRIP STEEL

AMERICAN Steel & Wire Co., 208 S. La Salle St., Chicago, Ill.
(See page 451.)

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

CARPENTER Steel Co., Reading, Pa.

COLUMBIA Steel Co., Elyria, O.

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

FRASSE & CO., Peter A., New York, N. Y. (Importers.) "Poldi."
(See page 219.)

KRUPP—See Prosser & Son.

MORRIS & Bailey Steel Co., Pittsburg, Pa.

POLDI—See Frasse & Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 381.)

STANLEY Works, New Britain, Conn.

SUPERIOR Steel Co., Carnegie, Pa.

WEST Leechburg Steel Co., Farmers Bank Bldg., Pittsburg, Pa.

TOOL STEEL

ALLEN & Co., Edgar, 718 W. Lake St., Chicago, Ill. (Importers.)

ANDREW & Co., J. H., 107 West St., New York, N. Y. (Importers.) "Toledo."

ARROW—See Crowley Co.

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USE KRUPP STEEL IN YOUR CARS

And Feel Satisfied and Secure

Crank Shafts, Axles, Steering Knuckles, Gears, Frame Members, Shafts and all Forgings for Motor Cars

Carbon Steels
Nickel Steels
Chrome Nickel Steels
Vanadium Steels
Chrome Vanadium Steels
Silicon Manganese Steels
Krupp Steels

Now in Stock at New York:

Round Bars of Krupp Special **Chrome Nickel Steel,** Grade E. F. 60.0 ½" to 8" diameter for Gears, Axle Shafts, etc., having minimum elastic limit, 100,000 lbs. per square inch.

This steel can be oil or case hardened so as to have an elastic limit of over 200,000 lbs. Use this "TOUGHEST STUFF" and eliminate the breakages you are now having.

LOOK TO THE STEEL WORKS

FOR THOMAS PROSSER & SON 15 GOLD ST. NEW YORK Represented by AMERICAN OFFICE. STEEL

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STEEL (Continued)

TOOL STEEL (Continued)

ATLAS Crucible Steel Co., 66 Howard Ave., Dunkirk, N. Y.

BALDWIN Steel Co., Charleston, W. Va.

BECKER Steel Co. of America, 90 West St., New York, N. Y. (Importers.)

BISCHOFF—See Elliott, H. A.

BRAEBURN Steel Co., Braeburn, Pa.

BROWN & Co., 10th St. & Duquesne Way, Pittsburg, Pa.

CARBON Steel Co., ft. 32d St., Pittsburg, Pa. "Weto," "Cromo."

CARPENTER Steel Co., Reading, Pa. "Comet," "K-W," "Stentor."

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa. "Red Star."

COLUMBIA Tool Steel Co., Chicago Heights, Ill.

COMET—See Carpenter Steel Co.

CROMO—See Carbon Steel Co.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. "Arrow." **(See page 387.)**

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

CYCLOPS Steel Works, 265 E. Spring St., Titusville, Pa.

DANNEMORA—See Nash Co.

DANNEMORA—See Ward's Sons.

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.) "Bischoff."

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FIRTH-STERLING Steel Co., McKeesport, Pa.

FOX & Co., Samuel, 44 Cliff St., New York, N. Y. (Importers.) **(See page 387.)**

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi." **(See page 219.)**

HALCOMB Steel Co., Syracuse, N. Y.

HELLER Bros. Co., Newark, N. J.

HOBSON, Houghton & Co., 83 Beekman St., New York, N. Y. (Importers)

ILLINGSWORTH Steel Co., John (Frankford), Philadelphia, Pa.

JESSOP & Sons, Wm., 91 John St., New York, N. Y. (Importers.) **(See page 385.)**

K-W—See Carpenter Steel Co.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 90 West St., New York, N. Y. (Importers.) **(See page 525.)**

LUDLUM Steel Co., Watervliet, N. Y. "Pompton."

McINNES Steel Co., Corry, Pa.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

NASH Co., Geo. 217 Pearl St., New York, N. Y. (Importers.) "Dannemora," "Solar." **(See page 489.)**

NEW Process Steel Corp., Lancaster, Pa.

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

PITTSBURGH Tool Steel Wire Co., Monaca, Pa.

POLDI—See Frasse & Co.

POMPTON—See Ludlum Steel Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." **(See page 381.)**

RED STAR—See Colonial Steel Co.

ROECHLING Electro Steel Co., 173-77 Lafayette St., New York, N. Y. (Importers.)

SOLAR—See Nash Co.

STENTOR—See Carpenter Steel Co.

VANADIUM-ALLOYS Steel Co., Latrobe, Pa. "Vasco."

VASCO—See Vanadium-Alloys Steel Co.

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

WARD'S Sons, Edgar T., 25 Purchase St., Boston, Mass. (Importers.) "Dannemora." **(See page 489.)**

WETO—See Carbon Steel Co.

SPRING STEEL

ARROW—See Crowley Co.

BALDWIN Steel Co., Charleston, W. Va.

BRAEBURN Steel Co., Braeburn, Pa.

CAMBRIA Steel Co., Johnstown, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

CARPENTER Steel Co., Reading, Pa. "Flexo."

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. "Arrow." **(See page 387.)**

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FLEXO—See Carpenter Steel Co.

FOX & Co., Samuel, 44 Cliff St., New York, N. Y. (Importers.) **(See page 387.)**

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi." **(See page 219.)**

HALCOMB Steel Co., Syracuse, N. Y.

HARROW Spring Co., Colby-Abbot Bldg., Milwaukee, Wis.

HELMUTH Co., L., 17 Battery Pl., New York, N. Y. (Importers.)

ILLINOIS Steel Co., 203 S. La Salle St., Chicago, Ill.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

PENNSYLVANIA Steel Co., Morris Bldg., Philadelphia, Pa. **(See page 383.)**

POLDI—See Frasse & Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." **(See page 381.)**

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

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MAYARI STEEL

(MÝ-AR-EÉ)

NATURAL ALLOY. NICKEL-CHROME.

Manufactured From Cuban Ore

Crank-Shafts; Transmission, Drive and Jack Shafts; I-Beam, Tubular and Driving Axles; Connecting Rods; Transmission and Differential Gears, Case Hardened, Water or Oil Hardened; Frames; High Tension Bolts; Steering Knuckles; Springs; Miscellaneous Forgings to be Heat-Treated

In the untreated condition this steel may be forged, rolled or machined the same as carbon steel; experience in special steels is not essential. After heat-treatment will show from 50,000 to over 200,000 pounds per square inch Elastic Limit, according to grade and treatment. An excellent base for VANADIUM additions, superior to chrome-vanadium steel.
Supplied in round or square bars, flats; billets; forging blooms, concave spring flats. Rolled, smooth forged, cold drawn or turned bars.

Silico-Manganese Spring Steel

Concave Flats and Standard Rounds.

Tensile Strength 210,000, Elastic Limit 190,000, Elongation in 2" 10.0%, Reduction of Area 30.0%, Tough, Resilient, Fibrous.

Write for Descriptive Booklet

THE PENNSYLVANIA STEEL CO.

General Offices
Morris Building, Philadelphia

Works
Steelton, Pa.

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STEEL (Continued)

SPRING STEEL (Continued)

UNITED Steel Co., Canton, O. (See page 385.)

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

MANGANESE STEEL

KRUPP—See Prosser & Son.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 381.)

UNITED Steel Co., Canton, O. (See page 385.)

NICKEL STEEL

ALLEN & Co., Edgar, 718 W. Lake St., Chicago, Ill. (Importers.)

BALDWIN Steel Co., Charleston, W. Va.

BECKER Steel Co. of America, 90 West St., New York, N. Y. (Importers.)

CARBON Steel Co., ft. 32d St., Pittsburg, Pa. "Nico."

CARPENTER Steel Co., Reading, Pa.

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. (See page 387.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FITZSIMONS Co., Youngstown, O.

FOX & Co., Samuel, 44 Cliff St., New York, N. Y. (Importers.) (See page 387.)

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi." (See page 219.)

HALCOMB Steel Co., Syracuse, N. Y.

HELMUTH, Co., L., 17 Battery Pl., New York, N. Y. (Importers.)

ILLINOIS Steel Co., 203 S. La Salle St., Chicago, Ill.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 90 West St., New York, N. Y. (Importers.) (See page 525.)

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

NICO—See Carbon Steel Co.

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

POLDI—See Frasse & Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 381.)

UNION Drawn Steel Co., Beaver Falls, Pa. (See page 387.)

UNITED Steel Co., Canton, O. (See page 385.)

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

CHROME NICKEL STEEL

AMERICAN Import & Export Co., 150 Nassau St., New York, N. Y. (Importers.)

ARBO—See Carbon Steel Co.

ARROW—See Crowley Co.

BALDWIN Steel Co., Charleston, W. Va.

BECKER Steel Co. of America, 90 West St., New York, N. Y. (Importers.)

BISCHOFF—See Elliott, H. A.

CARBON Steel Co., ft. 32d St., Pittsburg, Pa. "Arbo," "Decco," "Shrapo."

CARPENTER Steel Co., Reading, Pa.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. "Arrow." (See page 387.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa. "Simplex," "Duplex."

DECCO—See Carbon Steel Co.

DUPLEX—See Crucible Steel Co. of America.

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.) "Bischoff."

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FOX & Co., Samuel, 44 Cliff St., New York, N. Y. (Importers.) (See page 387.)

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi." (See page 219.)

HALCOMB Steel Co., Syracuse, N. Y.

HELLER Bros. Co., Newark, N. J.

ILLINGSWORTH Steel Co., John (Frankford), Philadelphia, Pa.

ILLINOIS Steel Co., 203 S. La Salle St., Chicago, Ill.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 90 West St., New York. N. Y. (Importers.) (See page 525.)

McINNES Steel Co., Corey, Pa.

MAYARI—See Pennsylvania Steel Co.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

PENNSYLVANIA Steel Co., Morris Bldg., Philadelphia, Pa. "Mayari." (See page 383.)

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

POLDI—See Frasse & Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 381.)

ROECHLING Electro Steel Co., 173-77 Lafayette St., New York, N. Y. (Importers.)

SHRAPO—See Carbon Steel Co.

SIMPLEX—See Crucible Steel Co. of America.

TUSCO—See United Steel Co.

UNION Drawn Steel Co., Beaver Falls, Pa. (See page 387.)

UNITED Steel Co., Canton, O. "Tusco." (See page 385.)

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

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SCIENTIFIC
AUTOMOBILE CONSTRUCTION
Requires
ALLOY STEELS
USE THE BEST
Chrome Vanadium, Chrome Nickel, Chrome Carbon, 3½% Nickel
BARS—*Hot Rolled, Cold Drawn, Smooth Finish.*
BILLETS—*No Pipes, Uniform Quality, No Flaws.*
SLABS—*Cross Cut, No Seams.*
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THE UNITED STEEL CO

CANTON, OHIO
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Best Carbon Tool Steel

"Ark" High-Speed Steel

Annealed and Unannealed
For DIES and High-Grade TOOLS

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For Saws, Knives, Etc., Etc.
GIN SAW STEEL
HACK SAW STEEL

Annealed and Unannealed
Has an unexcelled record for High-Grade Work

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TOOL STEEL FORGINGS

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CLEVELAND, CHICAGO, SAN FRANCISCO

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STEEL (Continued)

VANADIUM STEEL

ALLEN & Co., Edgar, 718 W. Lake St., Chi-Ill. (Importers.)

ALVA—See Crucible Steel Co. of America.

BALDWIN Steel Co., Charleston, W. Va.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

CARPENTER Steel Co., Reading, Pa.

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa. "Alva."

FITZSIMONS Co., Youngstown, O.

HALCOMB Steel Co., Syracuse, N. Y.

HARROW Spring Co., Colby-Abbot Bldg., Milwaukee, Wis.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

McINNES Steel Co., Corry, Pa.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 381.)

UNION Drawn Steel Co., Beaver Falls, Pa.
(See page 387.)

UNITED Steel Co., Canton, O.
(See page 385.)

VANADIUM-ALLOYS Steel Co., Latrobe, Pa. "Vasco."

VASCO—See Vanadium-Alloys Steel Co.

VULCAN Crucible Steel Co., First St., Ali-

ALUMINUM COATED SHEET STEEL

ALUMALOYD Products Co., Canton, O.

HIGH-SPEED CUTTING STEEL

ALBION—See Hobson, Houghton & Co.

ALLEN & Co., Edgar, 718 W. Lake St., Chicago, Ill. (Importers.)

ANDREW & Co., J. H., 107 West St., New York, N. Y. (Importers.) "Toledo."

ARK—See Jessop & Sons.

ARROW—See Crowley Co.

ATLAS Crucible Steel Co., 66 Howard Ave., Dunkirk, N. Y. "Loco."

BALDWIN Steel Co., Charleston, W. Va. "Hudson."

BOHLERS—See Houghton & Richards.

BRAEBURN Steel Co., Braeburn, Pa.

BURGESS—See Cyclops Steel Works.

CAPITAL—See Nash Co.

CARDINAL—See Elliott, H. A.

CARPENTER Steel Co., Reading, Pa. "Star Zenith."

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

COLUMBIA Tool Steel Co., Chicago Heights, Ill.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. "Arrow."
(See page 387.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa. "Rex."

CYCLOPS Steel Works, 265 E. Spring St., Titusville, Pa. "Burgess."

DREADNOUGHT—See Halcomb Steel Co.

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.) "Cardinal."

FOX & Co., Samuel, 44 Cliff St., New York, N. Y. (Importers.)
(See page 387.)

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi."
(See page 219.)

HALCOMB Steel Co., Syracuse, N. Y. "Dreadnought."

HELLER Bros. Co., Newark, N. J.

HOBSON, Houghton & Co., 83 Beekman St., New York, N. Y. (Importers.) "Albion."

HOUGHTON & Richards, 145 Oliver St., Boston, Mass. "Bohlers."

HUDSON—See Baldwin Steel Co.

IMPROVED CAPITAL—See Ward's Sons.

JESSOP & Sons, Wm., 91 John St., New York, N. Y. (Importers.) "Ark."
(See page 385.)

JONES & Co., B. M., 141 Milk St., Boston Mass. (Importers.) "Mushet."

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

LINDENBERG Steel Co., 90 West St., New York, N. Y. (Importers.)
(See page 525.)

LOCO—See Atlas Crucible Steel Co.

LUDLUM Steel Co., Watervliet, N. Y. "Mohawk," "Seneca."

McINNES Steel Co., Corry, Pa.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

MOHAWK—See Ludlum Steel Co.

MUSHET—See Jones & Co.

NASH Co., Geo., 217 Pearl St., New York, N. Y. (Importers.) "Capital."
(See page 489.)

POLDI—See Frasse & Co.

RED CUT SUPERIOR—See Vanadium-Alloys Steel Co.

REX—See Crucible Steel Co. of America.

ROECHLING Electro Steel Co., 173-77 Lafayette St., New York, N. Y. (Importers.)

SENECA—See Ludlum Steel Co.

STAR ZENITH—See Carpenter Steel Co.

TOLEDO—See Andrew & Co.

VANADIUM-ALLOYS Steel Co, Latrobe, Pa. "Red Cut Superior."

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

WARD'S Sons, Edgar T., 25 Purchase St., Boston, Mass. (Importers.) "Improved Capital."
(See page 489.)

SELF-HARDENING CUTTING STEEL

AJAX—See Baldwin Steel Co.

ALLEN & Co., Edgar, 718 W. Lake St., Chicago, Ill. (Importers.)

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Automobile Work

Bars, Sheets and Shapes
Auto Body Steel
Alumaloyd Sheets
Sheet Copper
Solder, Wire, Spring Steel
Cold Finished Steel

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BEAVER FALLS, PA.

Makers of Bright Cold Finished Steel; Rounds, Flats, Squares, Hexagons, and Special Shapes, for shafting, machine construction, etc. Cold Drawn Bright Free Cutting Screw Steel, Brand AA1, for rapid machining in hand and automatic screw machines. Cone Steel, Axle Steel, Crucible and Open Hearth Nickel Steel, Chrome Vanadium Steel for automobile and bicycle parts, axles, etc.

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***and* WAREHOUSES:**
Atlanta, Boston, Buffalo, Chicago, Cincinnati, New York, Philadelphia.

Automobile Steels, Sheffield Made

Easy to Machine
Highest Physical Qualities
No Distortion in Heat Treating
Finished Bars and Billets in Stock

SAMUEL FOX & CO., New York, Inc.
Successors to
Muir Davidson Steel Co., 44 Cliff St., New York

ARROW BRAND
ARROW NICKEL ALLOY STEEL
CASE-HARDENING DIP-HARDENING CYANIDING
ONE OF THE ABOVE GRADES WILL MEET THE SPECIFICATIONS OF ANY PART OF YOUR CAR
DETERMINATIONS OF RELIABLE PHYSICAL TESTS DEMONSTRATE A COMBINATION OF HARDNESS AND TOUGHNESS PRODUCING A REMARKABLE ANTI-FATIGUE QUALITY
Furnished in billets, hot or cold-rolled bars and strips, hammer and drop forgings.
Detailed information upon request. Quotations upon receipt of specifications.
Samples free of charge for testing.
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STEEL (Continued)

SELF-HARDENING CUTTING STEEL (Continued)

BALDWIN Steel Co., Charleston, W. Va. "Ajax."

BLUE CHIP—See Firth-Sterling Steel Co.

FIRTH-STERLING Steel Co., McKeesport, Pa. "Blue Chip."

HALCOMB Steel Co., Syracuse, N. Y.

HOBSON, Houghton & Co., 83 Beekman St., New York, N. Y. (Importers.) "Soho."

ILLINGSWORTH Steel Co., John (Frankford), Philadelphia, Pa.

JESSOP & Sons, Wm., 91 John St., New York, N. Y. (Importers.)
(See page 385.)

JONES & Co., B. M., 141 Milk St., Boston, Mass. (Importers.) "Mushet."

MUSHET—See Jones & Co.

SOHO—See Hobson, Houghton & Co.

VULCAN Crucible Steel Co., First St., Allquippa, Pa.

STEPS

FORGED STEPS

(See Forgings, Drop)

SPECIAL STEPS AND RUNNING BOARDS

BOSSERT Co., Utica, N. Y.
(See page 217.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 219.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

ERDLE Perforating Co., 7 Factory St., Rochester, N. Y.

FORSYTH Bros. Co., Harvey, Ill.

HAYES Mfg. Co., Detroit, Mich. "Hayes-Stanwood."

HAYES-STANWOOD—See Hayes Mfg. Co.

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O.
(See page 157.)

KINSEY Mfg. Co., Toledo, O.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MOLINE Pressed Steel Co., East Moline, Ill.

MOTOR Parts Co., Plainfield, N. J. "Stanwood."

PARISH & Bingham Co., Cleveland, O.
(See page 171.)

STANWOOD—See Motor Parts Co.

UNITED States Metal Products Co., 111 Broadway, New York, N. Y.
(See page 83.)

STIRRUPS

JACK HANDLE STIRRUPS

(Attachment for adapting any Jack to be operated by foot power)

WADE & Fisher, 3807 Lake Ave., Chicago, Ill.

STONES

OIL STONES

(For cleaning platinum points on Spark Coils)

PIKE Mfg. Co., Pike, N. H.

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GASOLINE STRAINERS OR SEPARATORS

(For use between tank and carbureter to remove dirt and water. For Strainer Funnels—See Funnels, Gasoline)

ALLEN Wrench & Tool Co., Public & Eddy Sts., Providence, R. I.

AMERICAN Brass & Iron Co., Detroit, Mich.
(See page 83.)

ATKINS Carburetor Co., Dwight, Ill.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich.
(See page 209.)

BINGHAM Mfg. Co., 227 Prospect Ave., N. W., Cleveland, O. "Shurecleen."

BOUSMAN Mfg. Co., 1126 Plainfield Ave., Grand Rapids, Mich. "Grand Rapids."

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

BUSH Mfg. Co., Hartford, Conn.
(See page 363.)

CRUM-WILEY Mfg. Co., Peru, Ind.

DAVIDSON—See Wallace Supply Co.

ELLIS—See National Sales Co.

EMMONS Specialty Co., 241 E. Jefferson Ave., Detroit, Mich. "Esco."

ESCO—See Emmons Specialty Co.

FINDEISEN & Kropf Mfg. Co., 2125 Rockwell St., Chicago, Ill. "Rayfield."
(See page 95.)

G. & A. Carburetor Co., 450-52 Sixth Ave., New York, N. Y.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GRAND RAPIDS—See Bousman Mfg. Co.

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich.

HALLADAY Co., L. P., Streator, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANS Motor Equipment Co., La Crosse, Wis.

HARWOOD, C. F., 516 Atlantic Ave., Boston, Mass.

IDEAL Brass Works, Tenth & Canal Sts., Indianapolis, Ind.

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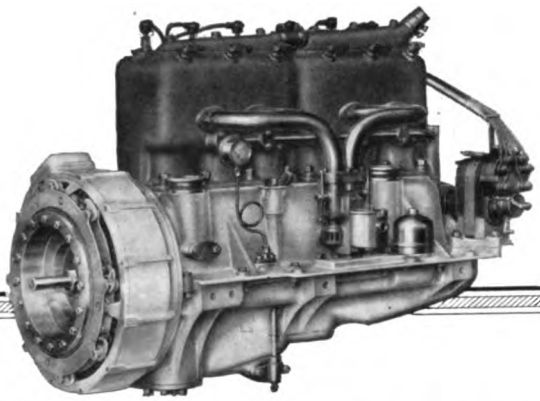

The U-S-L Electric Starter and Lighter abounds in hard-hitting talking points that directly influence the sales of U-S-L equipped cars.

Consider First the Simplicity

No noisy, power-consuming gears, chains or sprockets. The U-S-L Rotator—the sole moving part—bolted to the crank-shaft in place of the cast-iron fly-wheel applies its great starting power direct. No speed governors, clutches or bearings to oil.

Then the High Starting Speed

Instantly, without noise, jerk or jar, the U-S-L whirls the engine 200 to 400 R. P. M. No other starter spins the engine as fast.

Inherent Regulation—Another Exclusive U-S-L Feature

No external regulating devices are used. No energy wasted—automatic—no adjustments to make—battery charging commences at exceptionally low speed.

Write or call at our nearest Branch Office for all the U-S-L Facts.

Flyer 52 Sent on Request.

USL TRADE MARK
THE UNITED STATES LIGHT AND HEATING CO.

Electric STARTER and Lighter

Standard Equipment on

Jeffery Willys-Knight Moyer S G V
Sheffield-Simplex (England) Rochester Motor Rayfield Fire Pump

The **U. S. Light & Heating Co.**
General Offices and Factory: **Niagara Falls, N. Y.**
Branch Offices and Service Stations:
Boston New York Buffalo Cleveland Detroit
Washington, D. C. Chicago St. Louis San Francisco

USL

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STRAINERS (Continued)

GASOLINE STRAINERS OR SEPARATORS (Continued)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O. "Trusty."

McRAE & Roberts Co., 211-35 Campbell Ave., Detroit, Mich.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

MOSLER & Co., A. R., Mt. Vernon, N. Y. **(See page 299.)**

NATIONAL Sales Co., 45 Milk St., Boston, Mass. "Ellis."

OATHOUT, Chas. M., Saugerties, N. Y.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

R-M—See Randall-Miller Co.

RANDALL-MILLER Co., 93 Massachusetts Ave., Boston, Mass. "R-M."

RAYFIELD—See Findeisen & Kropf Mfg. Co.

REYNOLDS, George T., 341-49 Eddy St., Providence, R. I.

SHURECLEEN—See Bingham Mfg. Co.

STOTT-CROWLEY Mfg. Co., 1042 Grand River Ave., Detroit, Mich.

STROMBERG Motor Devices Co., 64-68 E. 25th St., Chicago, Ill.

TRUSTY—See Lunkenheimer Co.

WALLACE Supply Co., 412-20 Orleans St., Chicago, Ill. "Davidson."

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. **(See page 327.)**

WHEELER & Schebler, Indianapolis, Ind. **(See page 97.)**

ZERK Mfg. Co., Cleveland, O.

STRAPS

ANTI-RATTLING HOOD STRAPS

CAMPBELL—See Perkins-Campbell Co.

HOOVER Co., W. H., New Berlin, O.

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell." **(See page 48.)**

WINSHIP, W. W., 71 Summer St., Boston, Mass.

LEATHER STRAPS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y.

ARMSTRONG & Graham, 128-32 Jefferson Ave., Detroit, Mich.

BACKSTAY Machine & Leather Co., Union City, Ind.

BAUER-LEWIS Co., 363 Holden Ave., Detroit, Mich.

BRACE Leather Goods Co., 22 Wayne St., Pontiac, Mich.

BUNGE, Otto, 1052 Dawson St., Indianapolis, Ind.

CAMPBELL—See Perkins-Campbell Co.

CARTER Co., George R., 1600-20 Kentucky Ave., Connersville, Ind.

DECKER, J. C., Montgomery, Pa.

DESOCO—See Detroit Socket Co.

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich. **(See page 69.)**

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

ECONOMY Stay Co., Jefferson City, Mo.

FEESER Co., Frank S., 1102 Prospect St., Indianapolis, Ind. "Superior."

G & K—See Graton & Knight Mfg. Co.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K." **(See page 67.)**

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HANISCH Sons, R., 123-27 N. Halsted St., Chicago, Ill.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

HOOVER Co., W. H., New Berlin, O.

JEWELL Belting Co., 15 Trumbull St., Hartford, Conn.

KELLEY, A. F., 178 S. Main St., Providence, R. I.

KOPF-ENGEL Co., 49 Warren St., New York, N. Y.

KRONAUER & Co., Chas., 152 N. Desplaines St., Chicago, Ill.

LEATHER Products Co., 2268 Spring Grove Ave., Cincinnati, O.

NATIONAL Leather Mfg. Co., Niles, Mich. **(See page 69.)**

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O. "Campbell." **(See page 48.)**

REINHOLD Belting & Supply Co., 499 Atlantic Ave., Brooklyn, N. Y.

RHOADS & Sons, J. E., 12 N. Third St., Philadelphia, Pa.

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

SPECIALTY Harness Co., Dayton, Va.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

STRECKER Bros. Co., 117-19 Putnam St., Marietta, O.

SUPERIOR—See Feeser Co.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich. **(See page 485.)**

WAKEFIELD Sales Co., Trempealeau, Wis.

WARREN Leather Goods Co., 80 Austin St., Worcester, Mass.

WING Co., Charles, Amesbury, Mass. **(See page 397.)**

REBOUND STRAPS

(See also Shock Absorbers; also Springs, Supplementary)

BAUER-LEWIS Co., 363 Holden Ave., Detroit, Mich.

Complete Index to Classification appears on Pages 8 to 26.

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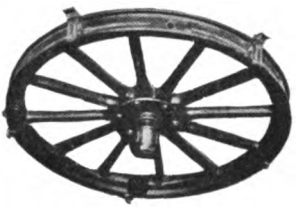
CHESTER DEMOUNTABLE RIMS

A Demountable Rim Instantly Attachable to any Wheel.



Dealers are having tremendous success selling the Chester Demountable Rim. With this simple, patented device, it is possible to attach the demountable rim to any ordinary wheel without removing the old rim from the wheel or without making any change whatever.

The illustrations show the device itself, the way these clamps are locked to an ordinary clincher rim, and the way the new rim is applied.

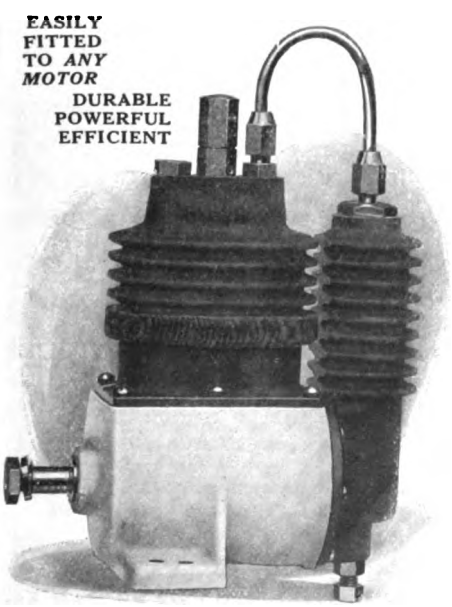
The entire outfit for any car sells at a very moderate price, and the dealer who sells it, finds it a very profitable accessory. Dealers! Get in touch with us at once.

MR. FORD OWNER!
Equip your own car with
"CHESTER"
Demountable Rims...$25.00
No alteration of wheels
Simple—Safe
Durable—Economical—Quick
Easy for woman to operate
Send for Book
"Final Word in Demountables"
Ask your dealer
"CHESTER" Demountable Rim Co.
Fall River, Mass.

Chester
Demountable Rim Company
FALL RIVER, MASS.

The "M-P" Motor Tire Pump

EASILY FITTED TO *ANY MOTOR*
DURABLE
POWERFUL
EFFICIENT



FILLS YOUR TIRES IN FIFTEEN SECONDS

Can be used on any type of Motor Car

LARGE or SMALL

THE "M-P" TIRE PUMP is Standard Equipment on such cars as the "Cadillac," etc.

OUR PUMP may also be attached to any electrical motor, and be moved about in any garage to fill tires wherever necessary. We will supply pump and 12 feet of hose with connections. You supply motor, board and wheels.

We want dealers not only to handle our pump, but also cyclecars, carburetors, spark plugs and other accessories.

NATIONAL UNITED SERVICE CO.
DETROIT, MICH

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STRAPS (Continued)

REBOUND STRAPS (Continued)

BOWLING GREEN—See Sunvold & Parson Mfg. Co.

BRACE Leather Goods Co., 22 Wayne St., Pontiac, Mich.

BUCKEYE—See Central Brass & Fixture Co.

BUNGE, Otto, 1052 Dawson St., Indianapolis, Ind.

CARTER Co., George R., 1600-20 Kentucky Ave., Connersville, Ind.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich.
(See page 69.)

FEESER Co., Frank S., 1102 Prospect St., Indianapolis, Ind. "Superior."

G & K—See Graton & Knight Mfg. Co.

GILMER Co., L. H., 52 N. Seventh St., Philadelphia, Pa.
(See page 65.)

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K."
(See page 67.)

HOOVER Co., W. H., New Berlin, O.

McGREGOR—See U. S. Auto Bumper Co.

MESINGER Mfg. Co., H. & F., Austin Pl. & E. 144th St., New York, N. Y.

MITCHELL—See Motor Specialties Co.

MOTOR Specialties Co., Waltham, Mass. "Mitchell."

PACIFIC Leather Works, 239 12th St., Oakland, Cal. "Sierra."

PERKINS-CAMPBELL Co., 634 Broadway, Cincinnati, O.
(See page 48.)

SIERRA—See Pacific Leather Works.

SUNVOLD & Larson Mfg. Co., Sacred Heart, Minn. "Bowling Green."

SUPERIOR—See Feeser Co.

U. S. Auto Bumper Co., 20 E. 20th St., Chicago, Ill. "McGregor."

STARTING CRANK STRAPS

(See Holders, Starting Crank)

WEB STRAPS

BUFFALO Weaving & Belting Co., 234 Chandler St., Buffalo, N. Y.

STRIPS

SPRING LEAF LUBRICATING STRIPS

DANN Oil-Cushion Spring Insert Co., 2246 Indiana Ave., Chicago, Ill.
(See page 369.)

RIDEOVER—See Wadhams Oil Co.

WADHAMS Oil Co., Milwaukee, Wis. "Rideover."

SUPPLIES

DEALERS IN SUPPLIES

(This is a list of Dealers and Jobbers in Automobile Supplies who advertise in this publication)

POST & Lester Co., 112 Allyn St., Hartford, Conn.
(See page 227.)

PRUDEN Hardware Co., W. E., 864-66 Eighth Ave., New York, N. Y.
(See page 227.)

ZINKE Co., 1326 Michigan Ave., Chicago, Ill.
(See page 287.)

SUPPORTS

HOOD SUPPORTS OR ARCH BARS

CROSBY Co., Buffalo, N. Y.
(See page 539.)

KINSEY Mfg. Co., Toledo, O.

KONIGSLOW Mfg. Co., Otto, E. 35th St. & Perkins Ave., Cleveland, O.

METAL Specialty Co., Cincinnati, O.

MOLINE Pressed Steel Co., East Moline, Ill.

SWITCHES

AUTOMATIC CUT-OUT SWITCHES

(For cutting out lights automatically when motor is not running)

PRICE Electric & Mfg. Co., Basic City, Va.

AUTOMATIC TIME SWITCHES

(For automatically turning the current on or off when charging storage batteries)

CAMPBELL Electric Co., Lynn, Mass.

CRESCENT—See McGill Mfg. Co.

DORLAND, Leslie C., 102 Montgomery St., Poughkeepsie, N. Y.

GENERAL Electric Co., Schenectady, N. Y.

McGILL Mfg. Co., 34 Oak St., Valparaiso, Ind. "Crescent."

SORENSON, P., 18 Dunham Pl., Brooklyn, N. Y.

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburg), Pittsburg, Pa.

ELECTRIC STARTER SWITCHES

(See also Starters Electric)

H & H—See Hart & Hegeman Mfg. Co.

HART & Hegeman Mfg. Co., 342 Capitol Ave., Hartford, Conn. "H & H."

HARTMAN Electrical Mfg. Co., Mansfield, O.

FOOT SWITCHES

HERZ & Co., 245 W. 55th St., New York, N. Y.
(See page 303.)

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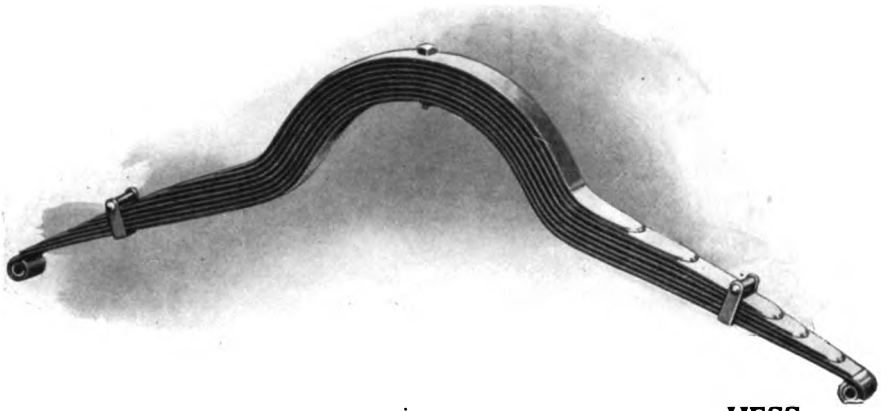
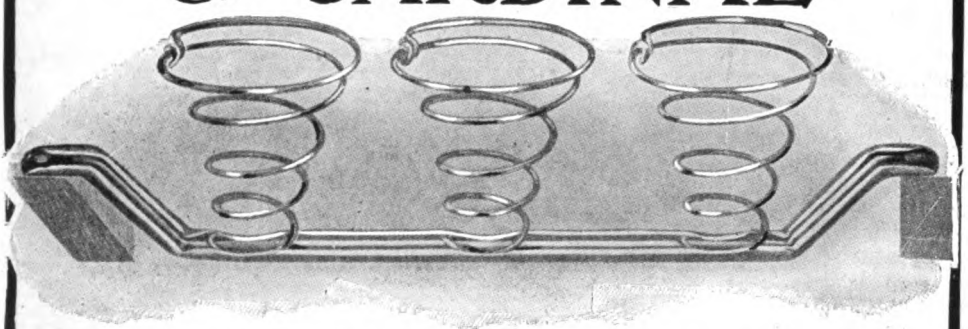


Our springs are all heat treated to our special formula which is our secret triple treatment.

Chrome Vanadium and Carbon Steels

HESS-PONTIAC SPRING & AXLE COMPANY PONTIAC, MICHIGAN

The CARDINAL



The Ideal Cushion and Seat Spring. Maximum Strength with Minimum Weight and Material. . . Perfect Construction.

ALL spirals in our spring work are made from the highest grade of spring wire, re-tempered, making it particularly strong and elastic. The spirals are firmly seated in a tempered steel arch with edges turned upward. They are absolutely noiseless, with greatest strength and durability. The very severest punishment the cushion may receive will not strain or injure it.

"The Cardinal" is shipped to you finished and ready for the frame—not more than thirty seconds required to spring the seat.

In your own interests, get full particulars and prices—it will pay you

BARBER MANUFACTURING COMPANY

ANDERSON, INDIANA, U. S. A.

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SWITCHES (Continued)

IGNITION SWITCHES

AMPCO—See S-M Novelty Mfg. Co.

ATWATER Kent Mfg. Works, 4937 Stenton Ave., Philadelphia, Pa.

BRIGGS & Stratton Co., 275 Milwaukee St., Milwaukee, Wis.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

CLUM Mfg. Co., Montgomery Bldg., Milwaukee, Wis.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

COUCH CO., S. H., 170 Purchase St., Boston, Mass. "Puritan."

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

FAHNESTOCK Electric Co., 129 Patchen Ave., Brooklyn, N. Y.

FAULTLESS—See Motsinger Device Mfg. Co.

HANDY—See Chicago Electric Mfg. Co.

IDEAL Switch Co., Plainville, Conn.

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

MOTSINGER Device Mfg. Co., Lafayette, Ind. "Faultless."

NEW YORK Coil Co., 338-40 Pearl St., New York, N. Y.

PERFEX—See Samson Electric Co.

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 421.)

PURITAN—See Couch Co.

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 139.)

S-M Novelty Mfg. Co., 52d St. & Baltimore Ave., Philadelphia, Pa. "Ampco."

SAMSON Electric Co., Canton, Mass. "Perfex."

SPLITDORF Electrical Co, Newark, N. J.
(See page 277.)

WELLS Mfg. Co., R. C., Fond du Lac, Wis.

WICO—See Witherbee Igniter Co.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WITHERBEE Igniter Co., Springfield, Mass. "Wico."

KICK SWITCHES

(See Switches, Ignition)

LIGHT SWITCHES

(For turning on and off Electric Lights on Car)

ADAMS-BAGNALL Electric Co., Cleveland, O.

BRIGGS & Stratton Co., 275 Milwaukee St., Milwaukee, Wis.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

CLUM Mfg. Co., Montgomery Bldg., Milwaukee, Wis.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

COWLES & Co., C., New Haven, Conn.
(See page 463.)

CULVER-STEARNS Mfg. Co., Worcester, Mass.
(See page 139.)

CUNO Engineering Corp., 80 S. Vine St., Meriden, Conn.

CUTLER-HAMMER Mfg. Co., Milwaukee, Wis.
(See page 185.)

DIAMOND H—See Hart Mfg. Co.

GENERAL Electric Co., Schenectady, N. Y.

H & H—See Hart & Hegeman Mfg. Co.

HANDY—See Chicago Electric Mfg. Co.

HART Mfg. Co., Hartford, Conn. "Diamond H."

HART & Hegeman Mfg. Co., 342 Capitol Ave., Hartford, Conn. "H & H."

HARTMAN Electrical Mfg. Co., Mansfield, O.

IDEAL Switch Co., Plainville, Conn.

L-N—See Leece-Neville Co.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L-N."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

NORTH East Electric Co., Rochester, N. Y.
(See page 531.)

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 139.)

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., Springfield, Mass. "Wico."

LOCK SWITCHES

(Ignition Switches equipped with lock to prevent unauthorized use of car)

AMPER Electric Co., 453 Willow St., Lockport, N. Y.

AUTOMOBILE Combination Lock Co., St. Louis, Mo.

BLACKBURN Specialty Co., 3405-09 Perkins Ave., Cleveland, O. "Blaco."

BLACO—See Blackburn Specialty Co.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

DELTA-STAR Electric Co., 617-31 W. Jackson Blvd., Chicago, Ill.

ESCO Mfg. Co., 1580 Woodward Ave., Detroit, Mich.

FACTORY Sales Co., Cleveland, O.

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SPRINGS

HIGGINS QUALITY

Established 1884

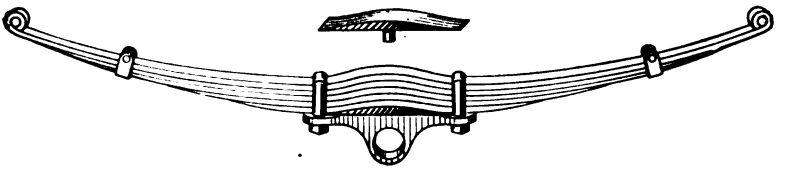
For **QUALITY** and **PROMPTNESS** we have accomplished our object. **BECAUSE**—for **THIRTY** years we have labored with the greatest patience and skill to Perfect a Spring.

Write for prices

HIGGINS SPRING & AXLE COMPANY, 1314 SIXTEENTH ST., RACINE, WIS.

TUTHILL UNBREAKABLE TITANIC SPRINGS

Guaranteed absolutely against center breakage.



Strongest at the center where the greatest strain comes. Adaptable to any make or model of car. Write our engineering department for details.

TUTHILL SPRING COMPANY, Est. 1880 766 Polk Street, CHICAGO

Valve Spring

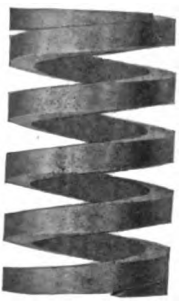
Automobile and Special SPRINGS

Vanadium and High Carbon Oil Tempered Springs

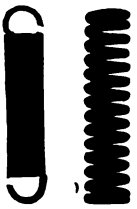
HIGH GRADE SPRINGS OUR SPECIALTY

N. Y. Wire & Spring Co.

F. A. WERNIG *Gen. Mgr.* **586-588 Washington St., N. Y.**



Spring Clutch



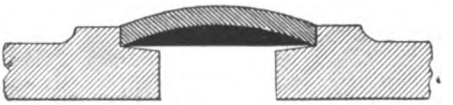
SPRINGS COILED AND FLAT

Steel, Brass and Phosphor Bronze, Spring Cotters, Small Washers

Send for Catalogue

M. D. Hubbard Spring Co.
Pontiac, Michigan

WELCH PATENT EXPANSION PLUG for Closing Core Holes



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SWITCHES (Continued)

LOCK SWITCHES (Continued)

H. P. B. Electric Co., 500 Fifth Ave., New York, N. Y.

LAWRENCE Specialty Co., Boston, Mass.

PERKINS Auto Thief Alarm & Lock Co., 228 Broadway, Detroit, Mich.

SAFETY Device Co., 372 S. Illinois St., Indianapolis, Ind.

SLY Mfg. Co., W. W., Cleveland, O.

STEERING WHEEL SWITCHES

(Ignition Switches for attachment to Steering Wheel)

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

SYSTEMS

ELECTRIC LIGHTING SYSTEMS

(See also Dynamos, Electric Lighting)

ADAMS-BAGNALL Electric Co., Cleveland, O.

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 209.)

ADLAKE—See Adams & Westlake Co.

APPLE Electric Co., Newark, N. J.

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."

DELCO—See Dayton Engineering Laboratories Co.

DYNETO Electric Co., Syracuse, N. Y.
(See page 377.)

ECONOMY Electric Co., Economy, Pa.

ELECTRIC Auto-Lite Co., Toledo, O. "Fisher."
(See page 159.)

ESTERLINE Co., 228 E. South St., Indianapolis, Ind.

FISHER—See Electric Auto-Lite Co.

FISHER Electrical Works, 2000 Larned St., W., Detroit, Mich.
(See page 347.)

HOLTZER-CABOT Electric Co., Brookline, Mass.

JESCO—See Jones Electric Starter Co.

JONES Electric Starter Co., 1401 W. Jackson Blvd., Chicago, Ill. "Jesco."

L-N—See Leece-Neville Co.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L-N."

LEONARD Electric Co., Ward, Bronxville, N. Y.

NORTH East Electric Co., Rochester, N. Y.
(See page 531.)

SAMSON Engineering Co., Louisville, Ky.

U-S-L—See U. S. Light & Heating Co.

U. S. Light & Heating Co., Niagara Falls, N. Y. "U. S. L."
(See page 389.)

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

SINGLE SPARK IGNITION SYSTEMS

ATWATER Kent Mfg. Works, 4937 Stenton Ave., Philadelphia, Pa. "Unisparker."

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

NEW YORK Coil Co., 338-40 Pearl St., New York, N. Y. "Rhoades."

RHOADES—See New York Coil Co.

UNISPARKER — See Atwater Kent Mfg. Works.

TACKS

UPHOLSTERY TACKS

ATLAS Tack Co., Fairhaven, Mass.

CLEVELAND Tack Works, 1313 E. 49th St., Cleveland, O.

COBB & Drew, Plymouth, Mass.

CRANDAL, Stone & Co., Binghamton, N. Y. "Leathermet."
(See page 365.)

EAGLE—See Turner & Seymour Mfg. Co.

GENESEE Tack Co., 39-57 Mt. Hope Ave., Rochester, N. Y.

GRAND Crossing Tack Co., (Grand Crossing), Chicago, Ill.

HIGGIN Mfg. Co., Newport, Ky.

LEATHERLIKE—See Turner & Seymour Mfg. Co.

LEATHERMET—See Crandal, Stone & Co.

MILONITE—See Morley Mfg. Co.

MILWAUKEE Tack Co., 27th Ave. & Wahl St., Milwaukee, Wis.

MORLEY Mfg. Co., 120 Boylston St., Boston, Mass. "Milonite."

NEIDER Co., F. A., Augusta, Ky.

PLYMOUTH Mills, Plymouth, Mass.

READE, Chas. W., 346 Sherman Ave., New Haven, Conn.

RIPLEY & Bartlett Co., Water St., Plymouth, Mass.

ROBERTS, G. G., South Ave., Whitman, Mass.

SALMOND & Son, Sam, Hanover, Mass.

SHELTON Co., Shelton, Conn.

TOCKWOTTON Co., 79 S. Main St., Providence, R. I.

TOWER Mfg. Co., Madison, Ind.

TURNER & Seymour Mfg. Co., Torrington, Conn. "Eagle," "Leatherlike."

WATERMAN Co., R. C., Water St., South Hanover, Mass.

TALC

TIRE TALC

AMERICAN Lava Co., Chattanooga, Tenn.

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Prevento."
(See page 131.)

BESTYET—See St. Louis Rubber Cement Co.

Complete Index to Classification appears on Pages 8 to 26.

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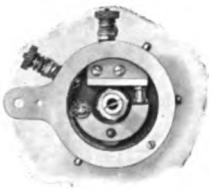
CONNECTICUT

AUTOMATIC IGNITION

Igniter assembled—furnished with either vertical or horizontal terminals.

Igniter with dust cover showing interrupter and cam.



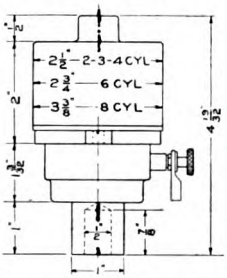
Detail view showing igniter with distributor cap only removed.

THE Connecticut Automatic Ignition System was designed to include all the advantages the preceding forms of ignition as used on internal combustion engines and also to be free from the limitations of each.

Its ideal adaption is in conjunction with a generator supplying current to a storage battery for lighting and starting.

The Connecticut Automatic Ignition System employs a "breaker box" of the magneto type, steps up the current through a transformer coil like the magneto, but takes its current from a storage battery. This system will in an emergency operate from a battery of six dry cells.

Connecticut Automatic Ignition is furnished in two types: Type E, coil carried under the motor hood integral with the control switch on the dash; Type G, coil is separate from the switch, and being heat proof, may be mounted at any convenient place under the bonnet.



Dimensions of 2, 3, 4, 6 and 8 cylinder igniters. Note—the only change in dimensions is in the diameter of the distributor case.

Systems E and G employ our Type S igniter—a double ball-bearing instrument.

The switch of the Connecticut Automatic Ignition System is equipped with an automatic kick-off to prevent drainage of battery current in case of careless handling.

Inasmuch as the best installation can be determined by consultation with engineers, upon receipt of information, blue prints and data concerning the car manufacturer's requirements, we will submit our recommendations, prices and terms.

FORD MASTER VIBRATOR

The Connecticut Master Vibrator is a specially designed instrument to furnish efficient and accurately timed ignition for Ford Model T cars fitted with fly-wheel magnetos.

It is the smallest and most compact instrument of its kind on the market, and is the only master vibrator which has a flush dash type of switch.

One adjustment.

Price $9, prepaid anywhere in the United States. Sold through the trade or direct.

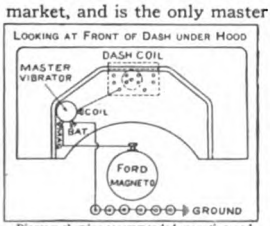
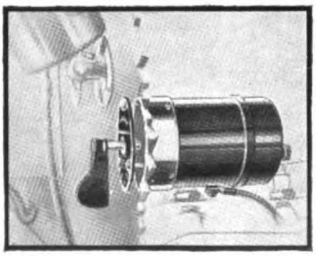


Diagram showing recommended mounting and wiring connection.



Phantom view showing ideal installation of the Connecticut Master Vibrator on Ford Dash.

Connecticut Tel. and Electric Co., Inc.
Meriden Conn.

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CONNECTICUT

LIGHTING FITTINGS

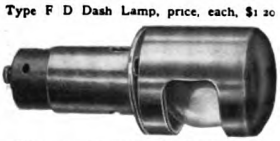
LIGHTS

Type T D Combined Dash and Trouble Lamp

Dash Trouble Lamp, complete. Price, each, $2 50
Dash Lamp only Price each $1 50
Cord, with attachment plug and socket. Price, each, $1 00

Can be removed from the dash and slipped into a socket attached to a 10-ft cord, and thus be utilized as a trouble lamp

Type F D Dash Lamp, price, each, $1 20



The only difference between Type F D and Type M D is that the Type F D is designed to be used on wood dash

Type M D Dash Lamp, price, each, $1 20

Type M D is provided with nut for attachment to metal dash

Type P S, Price, each, $1.50

Type P S, a dash lamp with a switch incorporated and not requiring a separate switch.

Connecticut Dash Lamps are furnished with a 4 CP 6 volt Tungsten bulb. Metal portions highly finished in bright nickel

Connecticut Lighting Fittings are of a superior quality in respect to workmanship and finish. Our prices on car manufacturer's contract are competitive even with fittings of inferior grades

SWITCHES

Connecticut Switches for automobile lighting control are made single or in gangs with as many controls as specified

1 Gang, Type N Lighting Switch

According to requirements, Connecticut Lighting Switches can include self-starter control, a dimming feature for the headlights, besides any combination of "on and off" controls for the lights

These switches are without question the neatest, simplest and easiest to install of any lighting switches now used for automobiles. The control buttons are large enough so they may be operated by a hand wearing a heavy gauntlet or driving glove

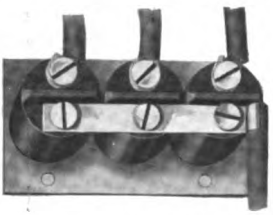
Put up single or in gangs of 1, 2, 3 and 4. The dimensions of the front plate and prices are as follow

Type D Dimming Switch

	Price Each
1-pt. switch, 1½ in. long x 1 in. wide,	$ .50
2-pt. switch, 1½ in. long x 1⅞ in. wide,	1.00
3-pt. switch, 1½ in. long x 2¾ in. wide,	1.50
4-pt. switch, 1½ in. long x3⅝ in. wide,	2.00

Each switch packed in a separate box. Standard packages, 24, except 4-gang, 12

The above prices refer to our Type N Switches. Prices on Connecticut:
Type S and Type R T Switches, each, $1.25
Type D Dimming Switch, by itself, 75c



Rear View of 3 Gang Switch Showing Connections

We are prepared to design and furnish any practicable combination for lighting controls for automobile use

TERMINALS

THE CONNECTICUT QUICK DETACHABLE TERMINAL

Secondary connector is fitted with an insulated collar or sleeve which covers the end of the wire and makes a very neat finish, it being safe to handle it without the liability of getting a shock. To attach, simply cut the wire off straight, push on the rubber sleeve, then slip stud carrying spring into hole in the rubber sleeve, pass the wood screw through the hole in the stud and screw it down tight. The screw makes contact with the stranded wire, and swells the insulation slightly, making it bind inside of rubber cap.

On account of the ball and socket construction of this terminal, the wire cannot kink or bend, as the ball socket allows it to swivel in any direction. The spring contact is sufficiently strong to prevent its jarring loose.

Price 6 cents. Packages of 100

FITTINGS

Type A two wire, Type A S one wire. Flanged Socket. Price each 50c

Type B two wire, Type B S one wire. Plain Socket. Price each 40c.

Type C two wire Type C S one wire. Double Socket. Price each 50c

Type D two wire, Type D S one wire. Capped Socket. Price each 50c

Type E two wire, Type E S one wire. Capped Plug. Price each 35c.

Type F two wire Plain Plug. Price each 25c

Standard Packages 25

The above illustrations shown are the principal fittings used with which it is possible to make up almost all combinations.

These fittings are made up for two wire or single (grounded) wiring. Specify kind when ordering

TROUBLE LIGHTS

PRICES:

Type R W two-wire, price without bulb, $1.25.
Type S W one-wire, price without bulb, $1.25.
These lights made substantially, are solid brass reflector, heavily nickeled, highly polished with protecting wire guard and Rubberoid handle.
Prices include 10 ft. of black rubber covered Duplex cord with Ediswan attachment plug to fit standard automobile sockets.

Type R G Trouble Lamp similar to Type R W except equipped with lens to protect bulb.

PRICES:

Type R G for two-wire system fitted with 6 volt, 4 CP Tungsten bulb, price each, $2.25.
Type S G for one-wire system fitted with 6 volt, 4 CP Tungsten bulb, price each, $2.25.

Connecticut Tel. and Electric Co., Inc., Meriden, Conn.

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THE WALLACE BARNES CO. ESTABLISHED 1857 Bristol, Connecticut

MACHINERY SPRINGS

for valves, clutches, brakes, etc. Also springs of every description from flat or round material.

"Barnes-made" Products have been the standard for fifty-six years and are guaranteed to be satisfactory.

Prices quoted upon receipt of specifications.

Established 1857.
THE WALLACE BARNES CO.
Wallace and Parallel Sts., Bristol, Conn.

Mfrs. of Small Springs of every description, Screw Machine Products, Spring Washers, Stampings, etc. Dealers in Spring Steel and Wire.

Spring Sense

Years of painstaking expert skill have been the real basis for the unusual success of

CLEVELAND-CANTON CHROME-VANADIUM AUTOMOBILE SPRINGS

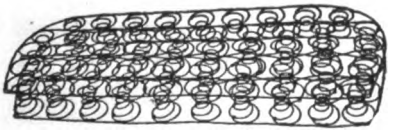
Our cross-roll process is well worthy of inquiring about.

Best Grade—Chrome-Vanadium
Next Best—Special Analysis

The Cleveland-Canton Spring Co.
CANTON, OHIO

THE WING PATTERN CUSHION SPRING

shown below is used by all the leading manufacturers of Automobiles in the East and has stood the test of ten years' service with satisfaction alike to makers of Cars as well as users.

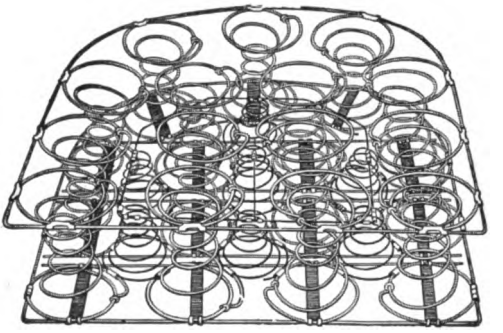


Cushion Spring (Wing Pattern) for Auto Seats

Manufactured by

THE CHARLES WING CO.
Amesbury, Mass., U. S. A.

Manufacturers of Auto Top Straps and Straps and Trimmings of many varieties, also wholesale dealers in all classes of Automobile Upholstering Leather and other materials.



ROUGH RIDER SPRINGS (Patented)

Best Automobile Spring Ever Made
No Possible Bumps or Jars — See these Auxiliary Springs?

The Best Cushions are made with

ROUGH RIDER SPRINGS

NOTHING SO COMFORTABLE

No Shocks or Jars when Rough Riders are used

Manufactured by

JACKSON CUSHION SPRING CO., Jackson, Mich.
RANDOLPH EDWARDS CO. Exclusive Selling Agents

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TALC (Continued)

TIRE TALC (Continued)

CENTURY—See Arnstein, Eugene.

COHUTTA Talc Co., Dalton, Ga.

DOGGETT, Stanley, 11-13 Cliff St., New York, N. Y.

FAULTLESS—See Hawkeye Oil Co.

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

JEWEL—See Wadsworth-Howland Co.

MARSHALL Oil Co., Marshalltown, Ia. "Moco."

MOBO—See Stanley, John T.

MOCO—See Marshall Oil Co.

NATIONAL Cement & Rubber Co., 300-16 S. St. Clair St., Toledo, O.

NEVINS Co., Samuel, 109 E. Second St., Philadelphia, Pa.

NEW YORK Mica & Mfg. Co., Auburn, N. Y. "Wright."

NORTH Carolina Talc & Mining Co., Hewitts, N. C.

NORTHWESTERN Chemical Co., Marietta, O. "Slip-Easy."
(See page 129.)

OLD Roman Solder Co., 202 E. 46th St., New York, N. Y.

POUGHKEEPSIE Utilities Corp., 3840 Winnikee Ave., Poughkeepsie, N. Y. "Utility."

PREVENTO—See Atlas Auto Supply Co.

REFLEX Ignition Co., 211 High Ave., Cleveland, O.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo. "Bestyet."

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

SLIP-EASY—See Northwestern Chemical Co.

STANLEY, John T., 642 W. 30th St., New York, N. Y. "Mobo."
(See page 361.)

STEWARD Mfg. Co., D. M., Chattanooga, Tenn.

TIRE-EZE—See Warren Refining Co.

U. S. Mica Mfg. Co., Lytton Bldg., Chicago, Ill.

UTILITY—See Poughkeepsie Utilities Corp.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WARREN Refining Co., 1137 W. 11th St., Cleveland, O. "Tire-Eze."

WHITTAKER, W. H., 245 Front St., New York, N. Y.

WILLIAMS & Co., C. K., N. 13th St., Easton, Pa.

WRIGHT—See New York Mica & Mfg. Co.

TANKS

ACETYLENE TANKS

ACETYLENE Gas Co., 752 S. Pierce St., Milwaukee, Wis.

FIREBALL Gas Tank & Illuminating Co., 5010 Delmar Blvd., St. Louis, Mo.

GAS Tank Recharging Co., 256 Fifth St., Milwaukee, Wis. "Sun-Lite."

METEOR Auto Tank Co., 1666 Broadway, New York, N. Y.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.
(See page 509.)

TOWER Mfg. Co., Madison, Ind.

SEARCHLIGHT Co., 1016 Karpen Blvd., Chicago, Ill.

SUN-LITE—See Gas Tank Recharging Co.

EMERGENCY OR RESERVE TANKS

(For carrying a reserve supply of gasoline or oil)

DOVER Stamping & Mfg. Co., Cambridge, Mass.
(See page 97.)

VOGEL & Bros., Wm., Brooklyn, N. Y.

FUEL AND WATER TANKS

A-Z Co., 530 W. 56th St., New York, N. Y.

AIR-TIGHT Steel Tank Co., Oliver Bldg., Pittsburg, Pa.

AMERICAN Steel Package Co., Defiance, O.

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BADGER & Sons Co., E. B., 68-69 Pitts St., Boston, Mass.

BRISCOE Mfg. Co., Detroit, Mich.

BRISKIN Mfg. Co., 539 N. Capitol Ave., Indianapolis, Ind.

BUNN-HUTCHINSON Co., 2074 E. 22d St., Cleveland, O.

BUSH Mfg. Co., Hartford, Conn.
(See page 363.)

BUSHNELL Tank Works, Bushnell, Ill.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

DETROIT Formed Metal Co., Larned & Shelby Sts., Detroit, Mich.

EUREKA Auto Parts Mfg. Co., 1915 Pine St., St. Louis, Mo.

FEDERAL Pressed Steel Co., Milwaukee, Wis.
(See page 291.)

FREELAND Sons Co., B. F., Sturgis, Mich.

GOETZ Co., 1802 Clybourn Ave., Chicago, Ill.

HARTFORD Sheet Metal Works, 325 N. Front St., Hartford, Conn.

HAYES Mfg. Co., Detroit, Mich.

HEARD Mfg. Co., 1318 S. Main St., Los Angeles, Cal.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

IDEAL Sheet Metal Works, 2809 Michigan Ave., Chicago, Ill.
(See page 327.)

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Jasco."
(See page 399.)

JASCO—See Janney, Steinmetz & Co.

JOHNSON'S Automobile Sheet Metal Works, W. N., 620-28 South J St., Richmond, Ind.

Complete Index to Classification appears on Pages 8 to 26.

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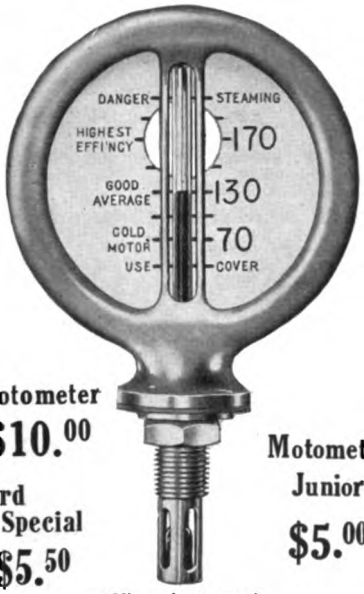
THE "KOVEN"
Galvanized Iron Gasoline Storage Tanks

ARE THE BEST AND CHEAPEST OBTAINABLE

L. O. KOVEN & BROTHER

50 CLIFF STREET, NEW YORK

WRITE FOR INFORMATION



Motometer $10.00

Ford Special $5.50

Motometer Junior $5.00

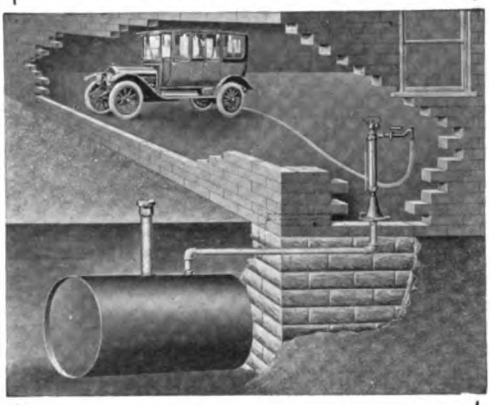
(View from seat)

Boyce Motometer attached to the radiator cap in 5 minutes

THE MOTOMETER CO., Inc.
1790 BROADWAY, NEW YORK

SCAIFE GASOLINE STORAGE OUTFITS

Have no complicated parts to get out of order.



The Cheapest Safe and Thoroughly Practical Outfit Sold.

Wm. B. SCAIFE & SONS CO.
Founded 1802
PITTSBURGH, PA.
New York Office: 26 Cortlandt St.

AIR PRESSURE TANKS FOR GARAGE TIRE STATIONS
AIR PRESSURE MOTOR STARTER TANKS

ROUND AND SQUARE BOLSTER UNDERHUNG MODELS
"JASCO" LEAKLESS TANKS FOR TRUCKS AND BOATS

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TANKS (Continued)

FUEL AND WATER TANKS (Continued)

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y.
(See page 199.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KINSEY Mfg. Co., Toledo, O.

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 399.)

LAWSON Co., F. H., Cincinnati, O.

LONG Mfg. Co., Detroit, Mich.
(See page 323.)

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE pressed Steel Co., East Moline, Ill.

NATIONAL Can Co., Detroit, Mich.

PARAGON Auto-Parts Mfg. Co., 506 W. 53d St., New York, N. Y.

PERFEX Radiator Co., Racine, Wis.

PRESSED Steel Tank Co., West Allis, Wis.

R. & H. Sheet Metal Co., Abington, Mass.

REID Co., 1504 Third Ave., Moline, Ill.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SANFORD Mfg. Co., F. C., 1235-41 Howard Ave., Bridgeport, Conn.

SCAIFE & Sons Co., Wm. B., Pittsburg, Pa.
(See page 399.)

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SUSSMAN & Rosenberg Mfg. Co., M., Tarrytown, N. Y.

TRAGESER Steam Copper Works, John, 447-57 W. 26th St., New York, N. Y.

WELDED Steel Barrel Corp., Leib & Wight Sts., Detroit, Mich.

WESTERN Drop Forge Co., Marion, Ind.
(See page 525.)

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

XARDELL Bros. Co., 28 Broadway, Utica, N. Y.

GASOLINE STORAGE TANKS AND SYSTEMS

AIR-TIGHT Steel Tank Co., Oliver Bldg., Pittsburg, Pa.

AMERICAN Oil Pump & Tank Co., Central & Kindel Aves., Cincinnati, O.

AMERICAN Steel Package Co., Defiance, O.

ANCHOR Brass Works, 141-43 W. Austin Ave., Chicago, Ill. "Savo."

BEMAN Automatic Oil Can Co., Meadville, Pa.

BOWSER & Co., S. F., Fort Wayne, Ind.

BUSHNELL Tank Works, Bushnell, Ill.

BUTLER Mfg. Co., 1215-17 W. Tenth St., Kansas City, Mo.

CHAMPION—See Cleveland Faucet Co.

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O. "Champion."

COLUMBIAN Steel Tank Co., 1605 W. 12th St., Kansas City, Mo.

DELPHOS Mfg. Co., 100-24 S. Pierce St., Delphos, O.

EASTERN Oil Tank Co., 146 Fletcher St., Lowell, Mass.

FREELAND Sons Co., B. F., Sturgis, Mich. "Pioneer."

GILBERT & Barker Mfg. Co., Springfield, Mass.

HARRY Steel Co., O. K., 2333-35 Papin St., St. Louis, Mo.

HELLER-ALLER Co., Napoleon, O.

HOLIHAN Mfg. Co., 21st & Jefferson Sts., Detroit, Mich.

HYDRAULIC Oil Storage & Engineering Co., 22 Albany St., New York, N. Y. "Snells."

IDEAL—See Janney, Steinmetz & Co.

IDEAL—See Kupferle Bros. Mfg. Co.

IMPERIAL—See Western Oil Pump & Tank Co.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Ideal."
(See page 399.)

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 399.)

KUPFERLE Bros. Mfg. Co., 600-04 N. Second St., St. Louis, Mo. "Ideal."

LITTLE GEM—See Western Oil Pump & Tank Co.

LITTLE SAMPSON—See Western Oil Pump & Tank Co.

MILWAUKEE Tank Works, 146-56 Clinton St., Milwaukee, Wis.

NATIONAL Store Specialty Co., Lancaster, Pa. "Pennsylvania."

NEIL & Co., Wm., 617 Division St., Chicago, Ill.

NILES Steel Tank Co., Niles, Mich.

NORWICH Storage Tank Co., Lackawanna Ave., Norwich, N. Y.

OFF & Co, Christian, 5 N. New Jersey St., Indianapolis, Ind.

PENNSYLVANIA—See National Stove Specialty Co.

PERFECTION—See Western Oil Pump & Tank Co.

PIONEER—See Freeland Sons Co.

PUMPLOK—See Simerson Co.

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

SAVO—See Anchor Brass Works.

SCAIFE & Sons Co., Wm. B., Pittsburg, Pa.
(See page 399.)

SEXTON Can Co., 228 Franklin St., Boston, Mass.

SIMERSON Co., Chas. H. (W. Hoboken), Hoboken, N. J. "Pumplok."

SNELLS—See Hydraulic Oil Storage & Engineering Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TAYLOR Mfg. Co., Montclair, N. J.

TIRRILL Gas Machine Lighting Co., 509 Fifth Ave., New York, N. Y.

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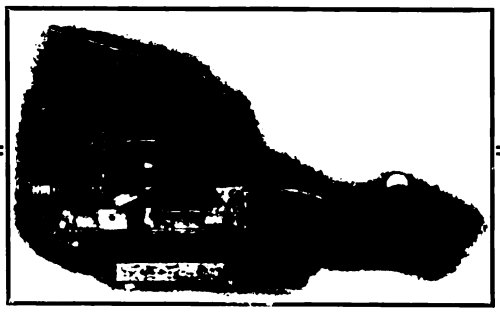
MODEL  MOTORS

A car with a poor motor is about as useful for strenuous work as a man with a weak heart.

Remember this—you may use the finest axles in the land, the strongest wheels made, the highest quality of every other part—but if the motor hasn't the POWER—your car will earn **anything** but a favorable reputation.

Model motors are the successful evolution of many years' experience in the motor building field. Power and silence are built into them. **Excessive weight** is eliminated and **strength increased** by correct design.

Write us—to-day.

PITTSBURGH MODEL ENGINE CO.

PITTSBURGH PA.

DAVIS TWO CYLINDER ONE-TON TRUCK MOTORS

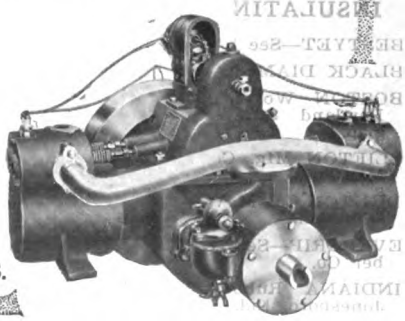
For absolute, dependable and reliable all-around service, the Davis 5¼" x 4¾" two-cylinder opposed one-ton truck motor cannot be equaled on the market to-day.

The Davis motor is being installed on the highest grade trucks by manufacturers everywhere.

Special features are the governor, which prevents excessive speeding of motor, thereby saving wear and tear on truck, and positive drive geared oil pump in base, absolutely assuring lubrication of all parts of the motor with no attention other than filling when required.

MR. MANUFACTURER! It will pay you to investigate the merits of Davis motors.

Why not write us to-day?



DAVIS MFG. CO.

15TH AVE & PARK ST., MILWAUKEE WIS.

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TANKS (Continued)

GASOLINE STORAGE TANKS AND SYSTEMS (Continued)

TOKHEIM Mfg. Co., 815 N. First St., W., Cedar Rapids, Ia.

UNITED States Pump & Tank Co., 3947 Laclede Ave., St. Louis, Mo.

VAC Liquid Equipment Co., Cedar Rapids, Ia.

WALLMAN Mfg. Co., 283-87 Fifth Ave., Milwaukee, Wis.

WAYNE Oil Tank & Pump Co., Fort Wayne, Ind.

WELDED Steel Barrel Corp., Leib & Wight Sts., Detroit, Mich.

WESTERN Oil Pump & Tank Co., 2437 Kosciusko St., St. Louis, Mo. "Little Sampson," "Imperial," "Perfection," "Little Gem."

OXYGEN TANKS

LINDE Air Products Co., 42d St. Bldg., New York, N. Y.

TIRE INFLATING TANKS

BISHOP-BABCOCK-BECKER Co., Cleveland, O.

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

LENNOX Chemical Co., 1201 E. 55th St., Cleveland, O.

LIQUID Carbonic Co., 3100 S. Kedzie Ave., Chicago, Ill.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

TIRE TESTING TANKS

DOVER Stamping & Mfg. Co., Cambridge, Mass.
(See page 97.)

TAPE

INSULATING AND TIRE TAPE

BESTYET—See St. Louis Rubber Cement Co.

BLACK DIAMOND—See Dunton Co.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass. "Evergrip."

CLIFTON Mfg. Co. (Jamaica Plain), Boston, Mass.

DUNTON Co., M. W., Providence, R. I. "Black Diamond."

EVERGRIP—See Boston Woven Hose & Rubber Co.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

KERITE Insulated Wire & Cable Co., 30 Church St., New York, N. Y.

MANSON—See Okonite Co.

NEW York Insulated Wire Co., 114 Liberty St., New York, N. Y.

OKONITE Co., 253 Broadway, New York, N. Y. "Manson."

RUSSELL Mfg. Co., Middletown, Conn.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo. "Bestyet."

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VAN Cleef Bros., 7709-11 Woodlawn Ave., Chicago, Ill

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburg), Pittsburg, Pa.

TAXIMETERS

AMERICAN Taximeter Co., 785-87 Seventh Ave., New York, N. Y. "Popp," "Jones."

INTERNATIONAL Taxameter Co. of America, 239 W. 68th St., New York, N. Y.

JONES—See American Taximeter Co.

PITTSBURG Taximeter Co., Centre & Negley Aves., Pittsburg, Pa.

POPP—See American Taximeter Co.

TEES

PIPE TEES

(See Fittings, Pipe)

TELEPHONES

LIMOUSINE TELEPHONES

(For Speaking Tubes—See Tubes, Speaking; For Annunciators—See Annunciators)

AMERICAN Electric Co., State & 64th Sts., Chicago, Ill. "Carphone."

CARPHONE—See American Electric Co.

CHAU-PHONE—See Western Electric Co.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

WESTERN Electric Co., 463 West St., New York, N. Y. "Chau-Phone."

TERMINALS

WIRE TERMINALS

(See also Connectors, Battery)

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

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The definition of convenience is ELK TERMINAL.
A perfect motor connection, clamps automatically. No soldering, no tools, no faulty ignition.

SAFETY:

The ELK TERMINAL is perfectly insulated. It can be tested without stopping the motor or getting a shock. It clamps firmly, the wire connection is by double bevel pressure screw, avoiding possibility of short circuit.

CLEANLINESS:

The ELK TERMINAL can be attached or detached instantly without the use of tools or soldering materials. It is completely covered which simplifies handling and obtains a sharper and clearer spark.

GUARANTEED FOR LIFE OF THE MOTOR

PRICE

Spark Plug Terminal . 25 cts. each
Battery Terminal . . . 20 cts. each

ELK MFG. CO., Makers
JOHN B. STAM & CO., Sole Distributors
1789 Broadway, New York

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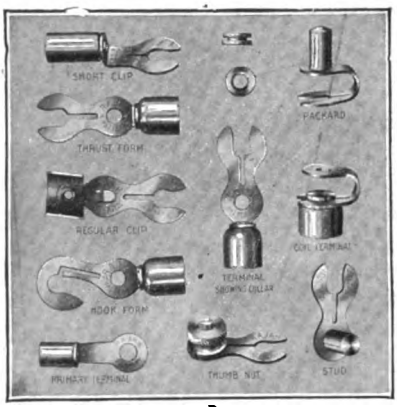
SPARK PLUGS and TERMINALS



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THE STANDARD SPEEDOMETER

(TRADE MARK)

Has more valuable and up-to-date features than any other instrument at any price; namely:
Indicates accurately speeds from zero up.
Can be attached to either wheel.
Indicates speed and mileage when backing.
Trip Odometer can be sent forward or back.
It is equipped with our universal pivot joint.
Correct driving gear ratio for all wheels.

PRICES:

3	inch	40	mile	$25.00	4	inch	80 mile	$50.00
3	"	60	"	$30.00	3	"	Clock Set	$75.00
4	"	60	"	$40.00	4	"	" "	$90.00

Standard Thermometer Co., 65 Shirley St., Boston, Mass.
Successors to Parker Mfg. Co.

DUPLEX WIRE TERMINALS

WIRE TERMINALS
BATTERY CONNECTORS (Flexible)
PRESSED COPPER LUGS
MINIATURE AND CANDELABRA LAMP BASES
AND SOCKET SHELLS
BRASS AND COPPER DRAWN CUPS

THE BLISS-CHESTER CO.

PROVIDENCE, R. I.

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TERMINALS (Continued)

WIRE TERMINALS (Continued)

BARCY-NICHOLSON Co., 845 Fort St., W., Detroit, Mich.

BECCO—See Michigan Motor Specialties Co.

BLISS-CHESTER Co., Providence, R. I. "Duplex."
(See page 403.)

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

BREAZNELL, J. H., 26 Court St., Brooklyn, N. Y.
(See page 137.)

CHAMPION Spark Plug Co., 1010 Avondale Ave., Toledo, O.
(See pages 293, 294, 295 and 296.)

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

DUPLEX—See Bliss-Chester Co.

ELK Mfg. Co., 68 E. 131st St., New York, N. Y.
(See page 403.)

EUREKA—See Morse, Frank W.

EVER-READY—See American Ever Ready Co.

EVERETT Mfg. Co., 162-64 N. May St., Chicago, Ill.

FAHNESTOCK Electric Co., 129 Patchen Ave., Brooklyn, N. Y.

FITZGERALD Mfg. Co., Torrington, Conn.
(See page 213.)

GOODSON—See Graham Mfg. Co.

GRAHAM Mfg. Co., 94 Point St., Providence, R. I. "Goodson."

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y.

HERZ & Co., 245 W. 55th St., New York, N. Y.
(See page 303.)

HI-PO Waterproof Battery Co., 1007 Atlantic Ave., Brooklyn, N. Y.

J-M—See Johns-Manville Co.

JEFFERY-DE WITT Co., 54 Butler Ave., Detroit, Mich.
(See pages 301 and 315.)

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

KINSEY Mfg. Co., Toledo, O.

LOMBARDI Motor Car Co., 67-71 Minerva St., Derby, Conn.

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St., E., Detroit, Mich "Becco."
(See page 139.)

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass. "Eureka."

MOSLER & Co., A. R., Mt. Vernon, N. Y.
(See page 299.)

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 421.)

RAJAH Auto-Supply Co., Bloomfield, N. J.
(See page 403.)

SHAIN, Chas. D., Box 53, Station L., Brooklyn, N. Y.
(See page 97.)

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

SUPERIOR Metal Products Co., Elyria, O.

WESTERN Electric Co., 463 West St., New York, N Y.

TESTERS

BATTERY TESTERS

(See Hydrometers)

ACID TESTERS

(See Gauges, Battery)

GASOLINE TESTERS

(See Hydrometers)

THERMOMETERS

VULCANIZER THERMOMETERS

RANDALL-FAICHNEY Co., Boston, Mass. "Ranfac."

RANFAC—See Randall-Faichney Co.

STANDARD Thermometer Co., 65 Shirley St., Boston, Mass.
(See page 403.)

TAYLOR Instrument Cos., 95 Ames St., Rochester, N. Y.

WEINHAGEN, H., 159-65 Leonard St., New York, N. Y.

WILSON & Wilson (Waverly Sta.), Boston, Mass.

THREAD

TOP AND UPHOLSTERY THREAD

AMERICAN Thread Co., 260 W. Broadway, New York, N. Y.

COLUMBIA—See Meyer & Co.

CRESCENT—See Meyer & Co.

HUB—See Meyer & Co.

MEYER & Co., John C., Lowell, Mass. "Hub," "Crescent," "Columbia," "Ruby."

RUBY—See Meyer & Co.

SUMMIT Thread Co., Summit St., East Hampton, Conn.

TIMERS

IGNITION OR SPARK TIMERS

(See also Systems, Single Spark Ignition)

ALMY Water Tube Boiler Co., ft. Rhoades St., Providence, R. I.

AMERICAN Electric Co., State & 64th Sts., Chicago, Ill. "Samson."

AMERICAN Garage & Timer Co., Suffolk, Va. "Edgerton."

AMPCO—See S-M Novelty Mfg. Co.

Complete Index to Classification appears on Pages 8 to 26.

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FOR AUTOMOBILE PARTS

TRUE TO PATTERNS
AND OF HIGHEST TENSILE STRENGTH

LARGE CAPACITY
PROMPT DELIVERIES

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SYRACUSE, N. Y.

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TOLEDO

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THE WARNER MANUFACTURING CO.
TOLEDO, OHIO

T. W. WARNER, Pres., and Gen'l Mgr.

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TIMERS (Continued)

IGNITION OR SPARK TIMERS (Continued)

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Maximus."

BEMUS—See Motor Specialties Co

BENFORD Mfg. Co., Box H., Mt. Vernon, N. Y. "Monarch."
(See page 303.)

BLACKBURN - ALLEN Co., Dayton, O. "Noxon."

BLITZ—See Electrical Specialty Mfg. Co.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See pages 396A and 396B.)

CUNO Engineering Corp., 80 S. Vine St., Meriden, Conn.

EDGERTON—See American Garage & Timer Co.

ELECTRICAL Specialties Mfg. Co., 1125 N. 22d St., Omaha, Neb. "Blitz," "Intensifire."

HEINZE Electric Co., Lowell, Mass.
(See page 499.)

HERZ & Co., 245 W. 55th St., New York, N. Y.
(See page 303.)

INTENSIFIRE — See Electrical Specialties Mfg. Co.

INTER-STATE Machine Co., New London, Conn. "Leavitt," "Uncas."

KLAHN—See Mosler & Co.

LEAVITT—See Inter-State Machine Co.

LEHMAN Mfg. Co., J. H., 727 Seventh Ave., New York, N. Y.

LONG Bros., Broadway & Buckeye St., Kokomo, Ind.

LUNDGREN Mfg. Co., Hale Bldg., Philadelphia, Pa.

MAXIMUS—See Beckley-Ralston Co.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MONARCH—See Benford Mfg. Co.

MOSLER & Co., A. R., Mt. Vernon, N. Y. "Klahn," "Umph."
(See page 299.)

MOTOR Specialties Co., Waltham, Mass. "Bemus."

NEW YORK Coil Co., 338-40 Pearl St., New York, N. Y. "Rhoades."

NOXON—See Blackburn-Allen Co.

PERFEX—See Samson Electric Co.

PHILADELPHIA Timer & Machine Co., Philadelphia, Pa. "Velos."
(See page 489.)

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 421.)

RHOADES—See New York Coil Co.

S-M Novelty Mfg. Co., 52d St. & Baltimore Ave., Philadelphia, Pa. "Ampco."

SAMSON—See American Electric Co.

SAMSON Electric Co., Canton, Mass. "Perfex."

SINTZ—See Wilmarth & Morman Co.

SPLITDORF Electrical Co., Newark, N. J.
(See page 277.)

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

UMPH—See Mosler & Co.

UNCAS—See Inter-State Machine Co.

VELOS—See Philadelphia Timer & Machine Co.

WELLS Mfg. Co., R. C., Fond du Lac, Wis.

WILMARTH & Morman Co., 1179 Monroe Ave., N. W., Grand Rapids, Mich. "Sintz."

ZIMMERMAN-SMITH Co., 72-74 Main St., North Tonawanda, N. Y.

TIPS

BURNER TIPS

(See Burners, Acetylene)

TIRES

FLANGED STEEL TIRES

(For adapting automobiles to run on railroad tracks)

GOODMAN Co., Herrin, Ill.

LEATHER TIRES

(For Leather Treads—See Treads, Detachable)

HORSESHOE—See Racine Auto Tire Co.

RACINE Auto Tire Co., 200 Clark St., Racine, Wis. "Horseshoe."

PNEUMATIC TIRES

(See also Tubes, Inner)

ACME Rubber Mfg. Co., Trenton, N. J.

ADVANCE Rubber Co., 18th St. & Eighth Ave., Brooklyn, N. Y.

ADVANCE Tire Sales Co., 1733 Broadway, New York, N. Y.

AJAX-GRIEB Rubber Co., Trenton, N. J.

BATAVIA Rubber Co., Batavia, N. Y.

BRAENDER Rubber & Tire Co., Rutherford, N. J. "Bull Dog."

BRIARCLIFF—See Century Rubber Co.

BULL DOG—See Braender Rubber & Tire Co.

CANVAS Tread Tire Co., Utica, N. Y.

CARSPRING—See New Jersey Car Spring & Rubber Co.

CATARACT Rubber Co., Wooster, O.

CENTURY Rubber Co., Plainfield, N. J. "Briarcliff," "Gripground."
(See page 407.)

COLUMB Tyres Import Co., 1891 Broadway, New York, N. Y. (Importers.) "Prowodnik."

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONVERSE Rubber Shoe Co., Malden, Mass. "Tuff-E-Nuff."

CROWN—See Great Eastern Rubber Co.

DAYTON Rubber Mfg. Co., 1204 Kiser St., Dayton, O.
(See page 407.)

DIAMOND Rubber Co., Akron, O.

DREADNAUGHT Tire & Rubber Co., Baltimore, Md.
(See page 411.)

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Save the Car

Seventy per cent of this year's Electric Pleasure Cars are equipped with Motz Cushion Tires. Commercial Truck owners also are coming more and more to Motz Tires.

For Motz Tires mean *car insurance* as well as riding comfort. They make rough roads smooth. There can be no blowouts—no punctures—no idle car through tire trouble.

Motz Cushion Tires

The slantwise bridges and undercut sides take up the strain, jolt, and jar. The dual treads mean added resiliency. And Motz tires have *more* and *better* rubber than others. The tread notches prevent skidding, an important advantage in places where metal non-skid devices are not allowed.

NOTE THE MILEAGE.

Motz Tires also mean most mileage. They are guaranteed for 10,000 miles. Many have traveled 20,000 and even 25,000 miles without trouble.

The Motz Book No. 80 on Tires will interest you. Write for it. It's free.

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Branches and Distributors in 52 Cities **Dealers Everywhere**

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High quality unguaranteed tires and tubes for jobbers under special brands.

Century Rubber Company

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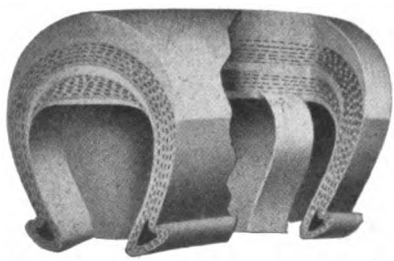
THE CONSTRUCTION DOES IT

THE DAYTON AIRLESS TIRE



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Its resiliency carries you comfortably and protects your car.

For Gasoline Cars
Our orders show a tremendous increase.

For Electric Cars
Excellent mileage results—no tire troubles.

For Trucks and Delivery Cars
No delays—cheaper mileage—economy.

For Fire Apparatus
75% of all motor fire apparatus—Dayton Airless.

Let us help you reduce your tire expense.

THE DAYTON RUBBER MFG. CO.

1204 Kiser St. **Dayton, Ohio**

Some good dealers territory still open

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TIRES (Continued)

PNEUMATIC TIRES (Continued)

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ENGLEBERT Tyre Co., 1928 Broadway, New York, N. Y. (Importers.)

FALLS Rubber Co., Cuyahoga Falls, O. "Greyhound."

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

FELLSEN Tire Co., 1995 Broadway, New York, N. Y.

FIRESTONE Tire & Rubber Co., Akron, O.

FISK Rubber Co., Chicopee Falls, Mass.

FRONTIER Tire & Rubber Co., 1054 Main St., Buffalo, N. Y.

GAULOIS Tire Corp., 49 W. 64th St., New York, N. Y. (Importers.)
(See page 411.)

GLOBE—See United & Globe Rubber Mfg. Cos.

GOODRICH Co., B. F., Akron, O.

GOODWEAR Tire Co., Chicago, Ill.

GOODYEAR Tire & Rubber Co., Akron, O.

GREAT Eastern Rubber Co., Trenton, N. J. "Crown," "Premier."

GREYHOUND—See Falls Rubber Co.

GRIPGROUND—See Century Rubber Co.

HARDMAN Tire & Rubber Co., Mill & Main Sts., Belleville, N. J.

HOOD Rubber Co., Watertown, Mass.
(See page 411.)

HORSESHOE—See Racine Auto Tire Co.

HYDRO—See St. Louis Tire & Rubber Co.

IMPERIAL—See McGraw Tire & Rubber Co.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

KELLY-SPRINGFIELD Tire Co., 220 W. 57th St., New York, N. Y.
(See page 409.)

KNIGHT Tire & Rubber Co., Canton, O.

L. & M. Rubber Co., Chicago, Ill.

LEE Tire & Rubber Co., Conshohocken, Pa.

M & M—See Morgan & Marshall Rubber & Tire Co.

McGRAW Tire & Rubber Co., East Palestine, O. "Imperial."

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Tire & Rubber Co., Newman St., Mansfield, O.

MARATHON Tire & Rubber Co., Front St., Cuyahoga Falls, O.

MATTSON Rubber Co., Lodi, N. J.
(See page 471.)

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

MOHAWK Rubber Co., Akron, O.

MORGAN & Marshall Rubber & Tire Co., East Liverpool, O. "M & M."

NASSAU—See Thermoid Rubber Co.

NATIONAL Co., 1400-10 Clybourn Pl., Chicago, Ill.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J. "Carspring."

NORTHLAND Rubber Co., 703-11 Northland Ave., Buffalo, N. Y.

PACKARD—See Pharis Tire & Rubber Co.

PATTERSON Rubber Co., Lowell, Mass.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

PHARIS Tire & Rubber Co., W. Main St., Newark, O. "Packard."

PORTAGE Rubber Co., Akron, O.

PREMIER—See Great Eastern Rubber Co.

PROWODNIK—See Columb Tyres Import Co.

PULLMAN Rubber Co., East Palestine, O.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

RACINE Auto Tire Co., 200 Clark St., Racine, Wis. "Horseshoe."

RACINE Rubber Co., Racine, Wis.
(See page 409.)

REPUBLIC Rubber Co., Youngstown, O.

RUTHERFORD Rubber Co., Rutherford, N. J. "Sterling,"

ST. LOUIS Tire & Rubber Co., St. Louis, Mo. "Hydro."

SAVAGE Tire Co., Main & Sicard Sts., San Diego, Cal.

SEAMLESS Rubber Co., New Haven, Conn.

STERLING—See Rutherford Rubber Co.

STODDARD, C. H., Worcester, Mass.

SWINEHART Tire & Rubber Co., Akron, O.

TEN Broeck Tyre Co., 840 S. 26th St., Louisville, Ky.

THERMOID Rubber Co., Trenton, N. J. "Nassau."
(See page 55.)

TUFF-E-NUFF—See Converse Rubber Shoe Co.

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

UNITED & Globe Rubber Mfg. Cos., Trenton, N. J. "Globe."

ZEE Zee Tire & Rubber Co., 33d & Walnut Sts., Philadelphia, Pa.

SOLID TIRES

DIAMOND Rubber Co., Akron, O.

FIRESTONE Tire & Rubber Co., Akron, O.

GAULOIS Tire Corp., 49 W. 64th St., New York, N. Y. (Importers.)
(See page 411.)

GIBNEY Tire & Rubber Co., Philadelphia, Pa.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

HOOD Rubber Co., Watertown, Mass.
(See page 411.)

HYDRO—See St. Louis Tire & Rubber Co.

KELLY-SPRINGFIELD Tire Co., 220 W. 57th St., New York, N. Y.
(See page 409.)

MILFORD Rubber Works, Milford, Ill.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

POLACK Tyre & Rubber Co., 246 W. 59th St., New York, N. Y.

PORTAGE Rubber Co., Akron, O.

REPUBLIC Rubber Co., Youngstown, O.

ST. LOUIS Tire & Rubber Co., St. Louis, Mo. "Hydro."

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Kelly-Springfield AUTOMOBILE TIRES

The average mileage of Kelly-Springfield Tires is higher by a thousand or two than the average tire's average mileage. And mileage is the most important thing you buy in tires.

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Detroit, Mich.	294 Jefferson Avenue
Cincinnati, Ohio	120-122 E. Eighth Street
San Francisco	489 Golden Gate Avenue
Atlanta, Ga.	19 Houston Street
Los Angeles, Cal.	1110 S. Main St.
Cleveland, Ohio	1846 Euclid Avenue
Baltimore, Md.	1421 N. Charles Street
Buffalo, N. Y.	912 Main Street
Seattle, Wash.	515 E. Pike Street
Portland, Ore.	328 Pine Street
Akron, Ohio	Kelly Avenue
Kansas City, Mo.	1515 Grand Avenue

RACINE AUTOMOBILE TIRES

Distributors

Arbogast Tire & Vulcanizing Co.....124 Erie Street, Toledo, O.
Automobile Equipment Co....225 Jefferson Avenue, Detroit, Mich.
Brazil Tire & Vulcanizing Co..314 N. Michigan Ave., Chicago, Ill.
Geo. W. Burkert & Co.....619 Wisconsin Street, Racine, Wis.
I. J. Cooper Rubber Co.....717 Main Street, Cincinnati, O.
I. J. Cooper Rubber Co.....25 N. Jefferson Street, Dayton, O.
I. J. Cooper Rubber Co.....263 N. Fourth Street, Columbus, O.
I. J. Cooper Rubber Co..219-221 W. Vermont St., Indianapolis, Ind.
J. C. Coxe Co.....126 Main Street, Whitewater, Wis.
Crescent Motor Co.....56-60 Main Street, Fond du Lac, Wis.
Courtney Motor Co.....Cedar Rapids, Ia.
Electrical Construction Co.....510-12 College Avenue, Racine, Wis.
J. G. Gareis Co.....123 Seventh Street, Pittsburgh, Pa.
J. H. Grimm Motor Car Co....100-108 W. 4th Street, Muscatine, Ia.
Herring Motor Co.....Herring Motor Building, Des Moines, Ia.
C. O. & E. S. Josslyn.....604 S. Main Street, Oshkosh, Wis.
J. A. Kurt Tire Co.....1529 Grand Avenue, Kansas City, Mo.
A. L. Kurtz Tire & Rubber Co.....805 Main Street, Peoria, Ill.
Marshall-Racine Rubber Co....911 Marquette Avenue, Minneapolis
E. J. Miles & Co.....Newton, Ia.
Model Auto Co.....315 S. Second Street, Clinton, Ia.
J. H. Markel.....Nebraska City, Neb.
Osler & Thompson Rubber Co..1245 S. Olive St., Los Angeles, Cal.
Ottumwa Auto Co.....Ottumwa, Ia.
Peavey Rubber Co.....2036 Commerce Street, Dallas, Tex.
Rochester Auto Supply Co.....352 Main Street E, Rochester, N. Y.
Racine Rubber Tire Co. of N. Y....838 Seventh Avenue, New York
St. Louis Rubber & Rep. Co...310 N. Channing Ave., St. Louis, Mo.
Severin Tire & Supply Co....600-602 N. Broadway, Oklahoma City
Simpson & Gibaud Co.....814 Main Street, Buffalo, N. Y.
Standard Tire & Rubber Co....104 Portland Street, Boston, Mass.
Standard-Racine Rubber Co....465 Milwaukee St., Milwaukee, Wis.
L. F. Schoelkopf.....116 South Pinckney Street, Madison, Wis.
J. A. Strimple.....219 East Milwaukee Street, Janesville, Wis.
H. H. Taylor.....211 West 6th Street, Austin, Tex.
O. D. Tucker, IV, & Co.....403 Main Street, Little Rock, Ark.
Tremain & Rankin Auto Co.....Fort Dodge, Ia.
Waterloo Auto Supply Co.....Waterloo, Ia.

RACINE RUBBER COMPANY

RACINE, WISCONSIN

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TIRES (Continued)

SOLID TIRES (Continued)

SWINEHART Tire & Rubber Co., Akron, O.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VICTOR Rubber Co., Springfield, O.

VULCAN Rubber Co., W. Lake Rd., Erie, Pa. "Vulco."

VULCO—See Vulcan Rubber Co.

SPECIAL TIRES

AIRPLEX Inner Tire Co., 3147 Locust St., St. Louis, Mo.

AMERICAN Spring Tire Co., 118 N. La Salle St., Chicago, Ill.

BRIDGE Web Tire Co., 2962 Prairie Ave., Chicago, Ill.

CARBONE Co., 100 State St., Albany, N. Y.

CARHART Laminated Tire Co., Moore Bldg., San Antonio, Tex.

DAYTON Rubber Mfg. Co., 1204 Kiser St., Dayton, O.
(See page 407.)

DEERY & Co., D. H., 37 E. Washington Ave., Bridgeport, Conn.

DIVINE Tire Co., 800 Broad St., Utica, N. Y.

EXPANSION Spring Rim Tire Co., 120 Boylston St., Boston, Mass.

FAVARY Tire Co., 111 Broadway, New York, N. Y.

LEE Tire & Rubber Co., Conshohocken, Pa.

McNAULL Auto Tire Co., 507-13 Superior St., Toledo, O.

MODERN Railway Appliance Co., 981 Broadway, Albany, N. Y. "Simmons."

MOLLITOR Tire Co., 4241 Irving Park Blvd., Chicago, Ill.

MOTZ Tire & Rubber Co., Akron, O.
(See page 407.)

OVERMAN Tire Co., 1853 Broadway, New York, N. Y.

PIONEER Auto & Vehicle Co., 3400 S. Broadway, St. Louis, Mo.

R. & S. Tire Co., 247 Jefferson Ave., Detroit, Mich.

RELIANCE—See Stahle Mechanical Tire Co.

ST. JOHNS Rubber Tire Co., 116 Broad St., New York, N. Y.

SIMMONS—See Modern Railway Appliance Co.

STAHLE Mechanical Tire Co., 110 State St., Boston, Mass. "Reliance."

STEEL Cushion Tire Co., 1 W. 34th St., New York, N. Y.

INEHART Tire & Rubber Co., Akron, O.

TRAUTMAN'S Air-Rubber Tube Co., 129 Sixth Ave., Brooklyn, N. Y.

TOOLS

CHAIN REPAIR TOOLS

BROWN & Son, J. C., Butler, Ind.

HARRIS & Reed Mfg. Co., 1500-22 W. 15th St., Chicago, Ill.

MACQUIC—See Macdonald & Co.

NECESSITY—See Macdonald & Co.

MACDONALD & Co., J. N. Wethersfield, Conn. "Necessity." "Macquic."

MEYERS, Henry T. C., 285 Helen Ave., Detroit, Mich.

ELECTRO MAGNETIC LIFTING TOOLS

(For lifting bolts, nuts, etc., from cylinders, gear cases, pans, etc.)

J. & B. Mfg. Co., 65 Eagle St., Pittsfield, Mass.

SYPHER Tool Mfg. Co., 2208 Warren St., Toledo, O.

W. & L. Mfg. Co., Buffalo, N. Y.

PISTON RING REMOVING TOOLS

EMPIRE—See S. B. R. Specialty Co.

McKAY-LEES Co., Chamber of Commerce Bldg., New Haven, Conn. "Sword."

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Empire."

SWORD—See McKay-Lees Co.

SPRING LEAF SEPARATING TOOLS

(For separating the spring leaves so they may be lubricated)

AUTO-SPRING Oiling Facilitator Co., 1220 E. 71st St., Cleveland, O.

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

DAYTON Malleable Iron Co., Dayton, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

HALLADAY Co., L. P., Streator, Ill.

KNOWLSONS—See Spring Leaf Lubricator Co.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MORGAN Mfg. Co., John St., Newport, R. I.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

SECURITY Reliner Co., 33 Meade St., Montgomery, N. Y.

SPRING Leaf Lubricator Co., 1002 Forest Ave., Ann Arbor, Mich. "Knowlsons."

STANDARD Engineering Works, 59 Social St., Woonsocket, R. I.

TIRE CHAIN ATTACHING TOOLS

BUFFUM Tool Co., Louisiana, Mo.

GEIER Co., P. A., 5112 St. Clair Ave., E., Cleveland, O.

TIRE CHAIN REPAIR TOOLS

BUFFUM Tool Co., Louisiana, Mo.

SHELLEY Tool Co., Saranac Lake, N. Y.

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288 Halsey Street, Newark, N. J.

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TOOLS (Continued)

TIRE TOOLS

(For taking off and putting on tires)

AMERICAN Carboneter Co., 1514 Michigan Ave., Chicago, Ill. "Johnson."

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

BECCO—See Michigan Motor Specialties Co.

BLUE Ribbon Tire Iron Co., 283-95 Fairfield Ave., Bridgeport, Conn.

BRICKEY, R. S., Aberdeen, S. Dak.

CALNAN Tire Remover Co., West Upton, Mass.

CARLSON & Co., Charles G., 3725 Wall St., Chicago, Ill. "Star."

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Springfield."

CLINCHER - TIRE - PLOW Co., Penobscot Bldg., Detroit, Mich.

DAYTON Malleable Iron Co., Dayton, O.

EASTMAN & Gale, Detroit, Mich. "Weiser's E. Z."
(See page 105.)

ECLIPSE—See Shawver Co.

EMPIRE—See S. B. R. Specialty Co.

EVER READY—See American Ever Ready Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

GIANT—See M. & G. Tire Tool Co.

HOOVER Co., W. H., New Berlin, O.

IDEAL Mfg. Co., 2112 N. Sixth St., Philadelphia, Pa.

JIFFY—See R. & B. Mfg. Co.

JOHNSON—See American Carboneter Co.

L. & M.—See Long Machine Works.

LONG Machine Works, Adam A., Ave. E & St. Paul St., Rochester, N. Y. "L. & M."

M. & G. Tire Tool Co., 184 Washington St., Providence, R. I. "Giant."

MAX Machine Co., Clinton, Mass.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco."
(See page 139.)

MILLER Bros. Auto & Supply House, 1105-07 14th St., N. W., Washington, D. C. "Nelson."

MORGAN Mfg. Co., John St., Newport, R. I.

MORRIS—See Pratt Mfg. Co.

NATIONAL Jack & Mfg. Co., 130-32 S. Clinton St., Chicago, Ill.

NELSON—See Miller Bros. Auto & Supply House.

NELSON, A. A., Warrenton, Va.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

O-TAK-A Tire Remover, Le Roy, N. Y.

PERFECT—See Pratt Mfg. Co.

PERFECT HANDLE—See Smith & Co.

PERFECTION Mfg. Co., New Martinsville, W. Va.

PRATT Mfg. Co., Wm. E., 85 W. Lake St., Chicago, Ill. "Morris," "Perfect."

R. & B. Mfg. Co., 5525 Woodland Ave., Philadelphia, Pa. "Jiffy."

RHODES Mfg. Co., S. Division St. & First Ave., Grand Rapids, Mich.

RUDOLF Tire Tool Co., 1007 James St., N. S., Pittsburg, Pa.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Empire."

SHAWVER Co., rear 31 W. Pleasant St., Springfield, O. "Springfield," "Eclipse."

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SPRINGFIELD—See Central Brass & Fixture Co.

SPRINGFIELD—See Shawver Co.

STAR—See Carlson & Co.

TOBEY, Wm. L., 9 Lewis St. (E. Boston), Boston, Mass.

UNIVERSAL Auto-Tire Remover Co., 948 Market St., San Francisco, Cal.

WALKER-MOORE Mfg. Co., 810 Walker St., Racine, Wis.

WEISER'S E. Z.—See Eastman & Gale.

TIRE VALVE RETHREADING TOOLS

HANSON, Henry L., 25 Union St., Worcester, Mass.

HERCULES—See Wells & Son Co.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

SUPERIOR Tap Co., Charlestown, N. H.

UTILITY—See Wells & Son Co.

WELLS & Son Co., F. E., 45 Ridell St., Greenfield, Mass. "Hercules," "Utility."

VALVE GRINDING TOOLS

(For Valve Grinding Machines—See Machines, Valve Seating)

ASHCROFT Mfg. Co., 119 W. 40th St., New York, N. Y.

ATLAS Machine Co., 110 W. Exchange St., Providence, R. I.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

CLEVELAND Pneumatic Tool Co., 6410 Hawthorne Ave., Cleveland, O.

FLEXIBLE Valve Remover Co., 110 W. Exchange St., Providence, R. I.
(See page 465.)

HEALY Tool & Appliance Co., Buffalo, N. Y.
(See page 521.)

IDEAL Valve Grinder Co., 1127 S. Olive St., Los Angeles, Cal.

JUST Specialty Works, J. H., 325 W. Fayette St., Syracuse, N. Y. "Simplicity."

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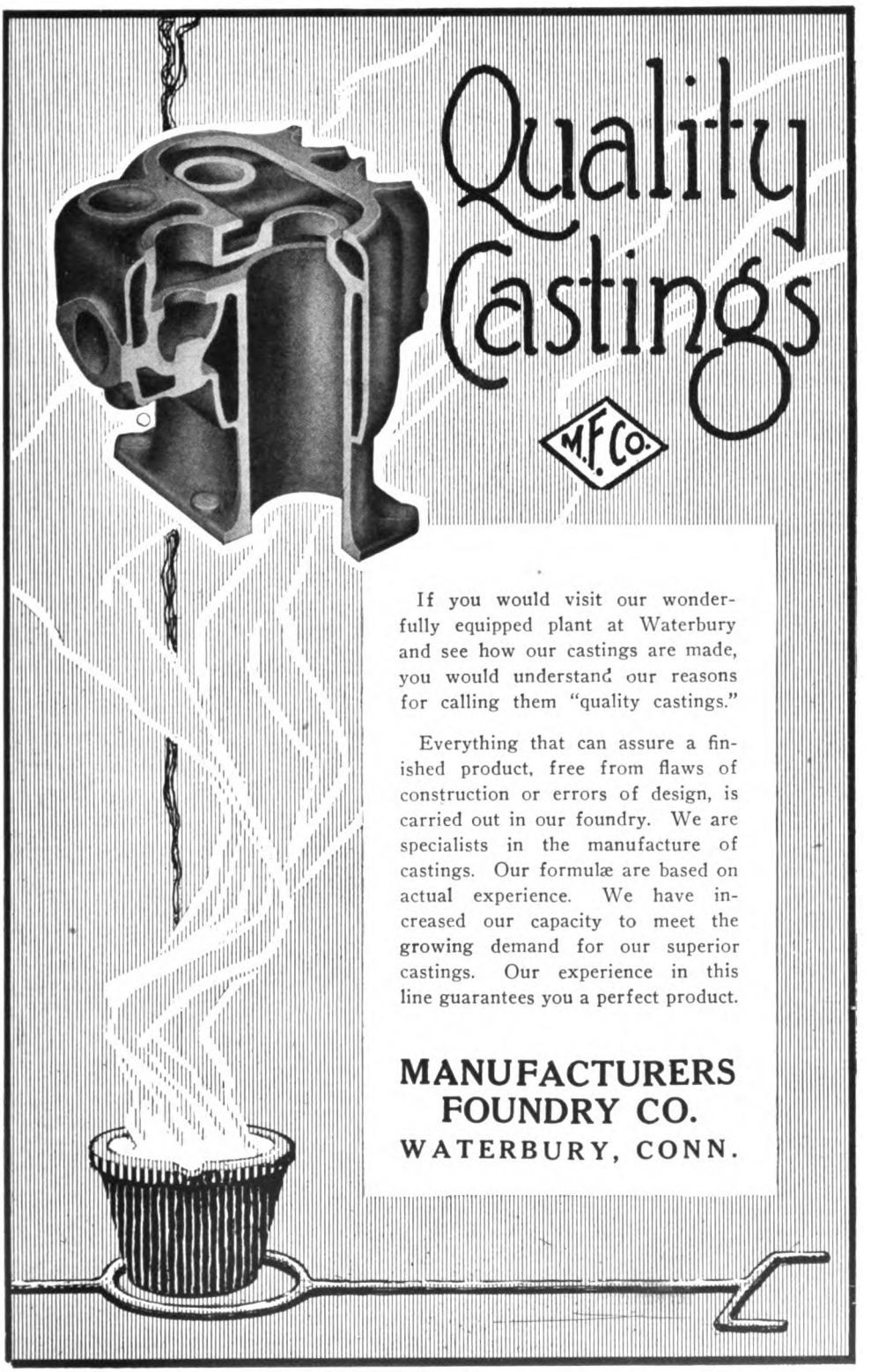

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TOOLS (Continued)

VALVE GRINDING TOOLS (Continued)

KELLOGG Mfg Co., Rochester, N. Y. (See page 527.)

LITTLE WONDER—See Smith, Irvin C.

MALLEABLE Iron Fittings Co., Branford, Conn. "Mifco." (See page 477.)

MARTIN Mfg. Co., 511 Vine St., Cincinnati, O. "Monarch."

MIFCO—See Malleable Iron Fittings Co.

MISCH—See Motch & Merryweather Machinery Co.

MONARCH—See Martin Mfg. Co.

MOSSBERG Co., Frank, Attleboro, Mass. (See page 553.)

MOTCH & Merryweather Machinery Co., 707 Lakeside Ave., N. W., Cleveland, O. "Misch."

OLSON Mfg. Co., 2727 O St., Lincoln, Neb.

OWEN—See Stewart & Co.

PERFECT—See Smith Machine Works.

SIMPLICITY—See Just Specialty Works.

SIOUX City Machine & Tool Co., First & Virginia Sts., Sioux City, Ia.

SMITH, Irvin C., 925 Santee St., Los Angeles, Cal. "Little Wonder."

SMITH Machine Works, Winton L., 78 Clinton St., Newark, N. J. "Perfect."

STEWART & Co., 171 Broadway, New York, N. Y. "Owen."

WALL, J. H., 290 Hope St., Bristol, R. I.

VALVE SEATING OR FACING TOOLS

AMERICAN Developing & Sales Co., Stamford, Conn. "Ideal." (See page 535.)

BRAUNSDORF-MUELLER CO., Elizabeth, N. J.

CRONE, F. G., 334 Genesee St., Buffalo, N. Y.

FOSNACHT—See Paro, H. G.

G. B. Garage & Mfg. Co., Hempstead, N. Y.

HEALY Tool & Appliance Co., Buffalo, N. Y. (See page 521.)

IDEAL—See American Developing & Sales Co.

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PARO, H. G., 30 N. Michigan Blvd., Chicago, Ill. "Fosnacht."

SARGENT Co., James M., Graniteville, Mass

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

FAY, W. B., Chicopee Falls, Mass.

FLEXIBLE Valve Remover Co., 110 W. Exchange St., Providence, R. I. (See page 465.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

HALLBAUER Lifter Co., 1537 Wellston Ave. (Wellston), St. Louis, Mo.

HALLGREN, Carl, 682 Summit Ave., Pasadena, Cal.

HEALY Tool & Appliance Co., Buffalo, N. Y. (See page 521.)

HILL—See S. B. R. Specialty Co.

HOADLEY, F. B., 479 Willow St., Waterbury, Conn.

KING Specialty Mfg. Co., 207 Washington St., Brookline, Mass.

KRAEMER—See United States Compass Co.

MECHANICAL & Electrical Mfg. Co., 2225 Prairie Ave., Chicago, Ill. "Triumph."

MERTZ Co., H. B., 1408 Rutherford Ave., Pittsburg, Pa.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium." (See page 445.)

MORGAN Mfg. Co., John St., Newport, R. I. "Utility."

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 539.)

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill. "Yarwood."

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PERFECT—See Smith Machine Works.

RADIUM—See Milwaukee Auto Specialty Co.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Hill."

SJOHOLM, N. P., 11 Westmoreland Pl., St. Louis, Mo.

SMITH Machine Works, Winton L., 78 Clinton St., Newark, N. J. "Perfect."

STANDARD Brass & Iron Works, 1820 St. Paul Ave., Milwaukee, Wis.

TRIUMPH—See Mechanical & Electrical Mfg. Co.

UNITED States Compass Co., Cedarburg, Wis. "Kraemer."

UTILITY—See Morgan Mfg. Co.

VLCHEK Tool Co., 10709 Quincy Ave., Cleveland, O.

WINSOR Mfg. Co., 55 Eddy St., Providence, R. I. (See page 445.)

YARWOOD—See National Jack & Mfg. Co.

VALVE SPRING LIFTING TOOLS

ATLAS Machine Co., 110 W. Exchange St., Providence, R. I.

BUFFUM Tool Co., Louisiana, Mo.

C. P.—See Clinton Machine Works.

CLINTON Machine Works, 460 High St., Clinton, Mass. "C. P."

DAYTON Malleable Iron Co., Dayton, O.

TOPS

AUTOMOBILE TOPS

AMERICAN Auto Trimming Co., 669 Mack Ave., Detroit, Mich.

AMERICAN Top Co., Jackson, Mich. (See page 417.)

Complete Index to Classification appears on Pages 8 to 26.

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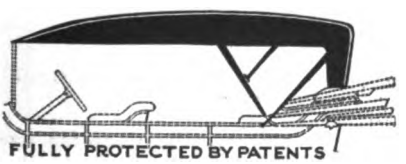

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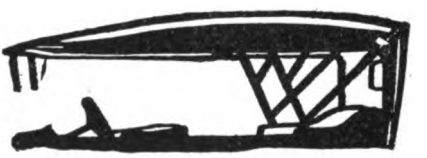

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AUTO CLOTHING

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TOPS (Continued)

AUTOMOBILE TOPS (Continued)

AMESBURY Top Co., Cedar St., Amesbury, Mass.

ANDREWS & Eagles Co., E. C., 414-16 Main St., Cambridge, Mass.

ATLANTA Automobile Top & Trimming Co., 755-57 Whitehall St., Atlanta, Ga.

AUTO Cape Top Co., 2334 Michigan Ave., Chicago, Ill.

AUTO Leather Goods Co., 11276 Linden Ave., Stratford, Conn.

AUTO Top Co., 221 E. Columbia St., Fort Wayne, Ind.

AUTO Top & Body Co., 257-59 N. Broad St. Philadelphia, Pa.

BALTIMORE Buggy Top Co., 107-13 W. Mt. Royal Ave., Baltimore, Md.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BARTON Auto Top Co., 63-65 Fort St., E., Detroit, Mich.

BIEHLS Auto Top Co., 31 S. Fifth St., Reading, Pa.

BISON Trimming Co., 1183 Jefferson St., Buffalo, N. Y.

BLISS Auto Top Co., C. P., 2303 Walnut St., Denver, Colo.

BLUE Ribbon Auto & Carriage Co., 1720 Fairfield Ave., Bridgeport, Conn.

BOHNET & Co., John, Grand Ave. & Washtenaw St., Lansing, Mich.

BONDY Mfg. Co., 3112 Euclid Ave., Cleveland, O.

BOYER-SCHLISKE Co., 1171 Van Dyke Ave., Detroit, Mich.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BROWNELL & Burt, 12 Washington St., Taunton, Mass.

BUOB & Scheu, 410 Court St., Cincinnati, O.

CADILLAC Auto Painting & Trimming Co., 144-56 Congress St., W., Detroit, Mich. "Universal."

CAPITOL Body Co., Ray St. & Madison Ave., Indianapolis, Ind.

CENTRAL Auto Top Co., 330 N. Illinois St., Indianapolis, Ind.

CHANSLOR & Lyon Top Co., 1208 S. Grand Ave., Los Angeles, Cal.

CHICAGO Carriage & Trimming Co., 1908 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 S. Michigan Ave., Chicago, Ill.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS & Son, G. A., Main & Church Sts., Akron, O.

COOLING Carriage Co., 402 French St., Wilmington, Del.

COLUMBIA Tire & Top Co., 1014 Commonwealth Ave., Boston, Mass.

CREAM City Trimming Co., 67-71 Juneau Ave., Milwaukee, Wis.

DALLAS Buggy Top Co., 562 Main St., Dallas, Tex.

DECKER Auto Top Co., Beaufait & Charlevoix Sts., Detroit, Mich.

DETROIT Motor Car Supply Co., 1280 Jefferson Ave., Detroit, Mich.

DORL-WILEY Co., 517 Chamber of Commerce, Detroit, Mich.
(See page 415.)

DUSTIN Auto Top & Slip Lining Co., 1200 Broadway, Denver, Colo.

ELMWOOD Auto Top & Supply Co., 707 Main Ave., Elmwood Place, O.

ENNIS, W. G., 18 Cumberland St., Charleston, S. C.

EUREKA Co., Rock Falls, Ill.

FALLS City Buggy Top Co., 128-30 S. Floyd St., Louisville, Ky.

FARNHAM & Nelson Co., 47 Union Ave., Boston, Mass.

FEHRING Carriage Co., 601-09 Third St., Columbus, Ind.

FRANK, W. H., 22-24 Harrison St., New Rochelle, N. Y.

GATES Mfg. Co., 530 N. Capitol Ave., Indianapolis, Ind.

GECO—See Glover Equipment Co.

GLOVER Equipment Co., Indianapolis, Ind. "Geco."
(See page 415.)

GOLDE-PATENT Mfg. Co., 509-15 W. 56th St., New York, N. Y.

HAWES Storm Front Co., 14 N. Monroe St., Coldwater, Mich.

HERCULES Rubber Co., 2 Hudson St., New York, N. Y.

HOLBROOK Co., West End Ave. & 67th St., New York, N. Y.

HOLCKER-ELBERG Mfg. Co., Kansas City, Mo.

HOLDEN One-Man Top Co., 1876 Broadway, New York, N. Y.

INDIANA Top & Vehicle Co., Laurenceburg, Ind.

IROQUOIS Auto Top Co., 401-07 Columbia St., Utica, N. Y.

IRVIN Mfg. Co., R. J., Morris & Division Sts., Indianapolis, Ind.

JACKSON Top Co., Jackson, Mich.

JEWETT Co., Geo. H., 172-74 Shrewsbury St., Worcester, Mass.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa.
(See page 75.)

KINGSBURY-LEAHY Co., 131-33 Hudson Ave., Albany, N. Y.
(See page 75.)

KROH Mfg. Co., C. Z., 1212-14 Jackson Ave., Toledo, O.

LA DUE Auto Top Co., 1109 Monroe St., Toledo, O.

LANE, T. W., Amesbury, Mass.

LIMOSETTE—See Mandel Limousine Co.

LONDON Auto Supply Co., 2540-48 Wabash Ave., Chicago, Ill.

LONDON Limousine Co., 112-16 Grove St., Hempstead, N. Y.

LONGDIN & Brugger Co., Fond-du-Lac, Wis.

LOUD, Fred A., Franklin & Lansdowne Sts., Cambridge, Mass.

McDONALD Bros., 1009-11 E. Pike St., Seattle, Wash.

MANDEL Limousine Co., 1445-47 Congress St., Chicago, Ill. "Limosette."

MANHATTAN Top & Body Co., 221-23 W. 64th St., New York, N. Y.

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AUTOMOBILE TOPS (Continued)

MANN-ALDRICH Carriage Co., 1300 Lincoln St., Denver, Colo.

MATT & Co., F., 491 Washington St., Newark, N. J.

MICHIGAN Top Co., 313 Riopelle St., Detroit, Mich.

MILWAUKEE Trimming Co., 549 E. Water St., Milwaukee, Wis.

MONAHAN Vehicle Co., Kinsley Ave. & Eagle St., Providence, R. I.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

MURRAY & Co., P. A., Newton, Mass.

NATIONAL Auto Top Co., 244-50 W. 49th St., New York, N. Y.

NATIONAL Auto Top Co., 1621 W. Broad St., Richmond, Va.

NEWTON & Son, W. H., 127 Elm St., Cortland, N. Y.

NOVELTY Carriage Works, 815-17 Second Ave., Spokane, Wash.

OHIO Top Co., 909-11 Broadway, Cincinnati, O.

OMAHA Auto Top Co., 709-11 S. 15th St., Omaha, Neb.

PEERLESS Buggy Top Co., York St. & Central Ave., Cincinnati, O.

PLUMSTEAD & Son, M., 614-26 Washington St., Lynn, Mass.

RAND'S Mfg. Co., Holden & Lincoln Aves., Detroit, Mich.

REARDON, J. J., Clark St., Amesbury, Mass.

ROSS & Browne, 6127-29 Cottage Grove Ave., Chicago, Ill.

RUCH Auto Top Co., Third & Sidney Aves., Mt. Vernon, N. Y.

RUDD Auto Top Co., 46 Bagg St., Detroit, Mich.

ST. LOUIS Top Co., 3025-29 Olive St., St. Louis, Mo.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHREIBER Carriage Mfg. Co., Chariton, Ia.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SHARRER Patent Top Co., 245 W. 55th St., New York, N. Y.
(See page 415.)

SHIELDS Carriage Co., 11 Carriage Ave., Amesbury, Mass.

SIEDER Mfg. Co., 31-33 E. Woodbridge St., Detroit, Mich.

SIMON Auto Top Mfg. Co., S., 310 E. 17th St., Kansas City, Mo.

SNOW-MOSS Co., 147 W. 83d St., New York, N. Y.

SPRINGFIELD Auto Top & Upholstering Co., 224-30 Dwight St., Springfield, Mass.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 71.)

STANDARD Top & Equipment Co., 1212 Huron Rd., Cleveland, O.

STERLING Auto Top Co., Detroit, Mich.

STERLING Top & Equipment Co., 518-22 W. 57th St., New York, N. Y.

STONE & Sons, C., 1658-74 Ogden Ave., Chicago, Ill.

STORM Buggy & Auto Top Co., Fostoria, O.

SUGNET, Geo. W., 297-301 Oak St., Buffalo, N. Y.

THOMPSON Co., E. J. (Forbes Field), Pittsburg, Pa.

UNIVERSAL—See Cadillac Auto Painting & Trimming Co.

VALENTINE, J. S., 432-38 Princeton Ave., Trenton, N. J.

VEHICLE Top & Supply Co., 3414 Lindell Ave., St. Louis, Mo. "Vesco."

VESCO—See Vehicle Top & Supply Co.

VETTER Auto Top Co., 95-97 West End Ave., New York, N. Y.

WALKER & Co., Alfred J., 223 W. 66th St., New York, N. Y.

WARNER Auto Top Co., 1646-50 Central Ave., Cincinnati, O.

WAYNESBURG Carriage Co., Waynesburg, O.

WEBER Co., M., 218-20 N. St. Clair St., Dayton, O.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WILSON Co., J. C., 15th St. & Warren Ave., Detroit, Mich.

WRIGHT & Co., C. E., Norfolk, Va.

TRAILERS

TRUCK TRAILERS

CAMPBELL Mfg. Co., Brooklyn, Mich.

DUNKLEY Co., Kalamazoo, Mich.

SHADBOLT Mfg. Co., Flushing Ave. & Cumberland St., Brooklyn, N. Y.

SHERWOOD Bros. Mfg. Co., 440 Main St., Canastota, N. Y.

TROY Wagon Works Co., Troy, O.

TRANSFERS

DECALCOMANIA TRANSFERS

MEYERCORD Co., Chamber of Commerce Bldg., Chicago, Ill.

NATIONAL Decalcomania Co., 238-40 N. 60th St., Philadelphia, Pa.

PALM, Fechteler & Co., 67 Fifth Ave., New York, N. Y.

TREADS

DETACHABLE TIRE TREADS OR PROTECTORS

ARTILLERY Auto Tire Protector Co., First National Bank Bldg., Pittsburg, Pa.

A. S. B.—See Queen Mfg. Co.

BRICTSON Mfg. Co., Brookings, S. D.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

COLORADO Tire & Leather Co., 1340 Acoma St., Denver, Colo. "Durable."

Complete Index to Classification appears on Pages 8 to 26.

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For BRAKES and CLUTCHES

Over 1,000,000 feet of material produced by our PATENTED PROCESS in daily use.

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TREADS (Continued)

DETACHABLE TIRE TREADS OR PROTECTORS (Continued)

DAVIS Robe & Armor Co., 8 N. State St., Chicago, Ill.

DURABLE—See Colorado Tire & Leather Co.

ECONOMY Tread Co., 113 Lenox Ave., New York, N. Y.

GOODYEAR Tire & Rubber Co., Akron, O.

HERCULES—See Republic Rubber Tire & Shoe Co.

INVINCIBLE Tire Co., 53 Sabin St., Providence, R. I.

KIMBALL Tire Case Co., 168 Broadway, Council Bluffs, Ia.

KING Tire Protector Co., Matthews Bldg, Milwaukee, Wis.

LEATHER Tire Goods Co., Niagara Falls, N. Y. "Woodworth."
(See page 57.)

MANSFIELD Tire & Rubber Co., Newman St., Mansfield, O.

MAPLEBAY Mfg. Co., Crookston, Minn.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

PACIFIC Leather Works, 239 12th St., Oakland, Cal. "Invincible," "Zig-Zag."

QUEEN Mfg. Co., Webster City, Ia. "A. S. B."

REPUBLIC Rubber Tire & Shoe Co., 152 W. 55th St., New York, N. Y. "Hercules."

SAMPSON Tire Protector Mfg. Co., Grand Island, Neb.

SLAMA Tire Protector Co., 1504 Grand Ave., Kansas City, Mo.

TRIPLE Tread Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

TWENTIETH Century Tire Protector Co., Midlothian, Tex.

UNIVERSAL Tire Protector Co., Angola, Ind.

WOODWORTH—See Leather Tire Goods Co.

X X X Auto Accessory Co., Springfield, Mass.

ZIG-ZAG—See Pacific Leather Works.

TREATING

HEAT TREATING

AMERICAN Metal Treatment Co., Elizabeth, N. J.
(See page 519.)

BIDLE Co., W. S., Cleveland, O.

BRIDGEPORT Metal Treating Co., 125 Stratford Ave., Bridgeport, Conn.

SCOTT, C. U., head of Wall St., Davenport, Ia.

TRIMMINGS

CLOTH AND CARPET TRIMMINGS

(See also Broadcloth; also Buttons; also Carpet; also Cloth; also Lace; also Linoleum; also Silk; also Whipcord)

ALF Co., Edward F., 420 E. Eighth St., Cincinnati, O.

BARRELL Co., Wm. L., 8 Thomas St., New York, N. Y.

BRIDGEPORT Coach Lace Co, 1731-37 Broadway, New York, N. Y.
(See page 351.)

CARR Co., F. S., Boston, Mass.
(See page 121.)

CHANDLER Oil Cloth & Buckram Co., East Taunton, Mass.

CHASE & Co., L. C., Boston, Mass.
(See page 123.)

DUSENBURY & Co., Louis, 222 Fourth Ave., New York, N. Y.

FINE Woolen Co., 58-60 Worth St., New York, N. Y.

GALLAND, Wechmar & Co., 456 Fourth Ave., New York, N. Y.

GERHAB, Jacob, 158-64 N. Third St., Philadelphia, Pa.

GIFFORD & Son, John A., 25 Park Pl., New York, N. Y.

HAARTZ, J. C., Boston, Mass.
(See page 237.)

HOOF Co., C. M., 317 W. Randolph St., Chicago, Ill.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa.

KENNEDY, Willing & Co., 524 Arch St., Philadelphia, Pa.

LAIDLAW Co., 126-32 W. 46th St., New York, N. Y.
(See page 269.)

LANDERS Bros. Co., Dept. A, Toledo, O.
(See page 443.)

LOUNSBERY & Sons, G. H., 107-09 W. Third St., Cincinnati, O.

MOSSMAN, Yarnelle & Co., Pearl St. & Maiden Lane, Fort Wayne, Ind.

MUTTY Co., L. J., Boston, Mass.
(See page 237.)

NORRIS & Sons, R. W., 342-48 N. Gay St., Baltimore, Md.

PARRY & Co., A. N., Amesbury, Mass.

PATTERSON & Greenough, 45 E. 17th St., New York, N. Y.

ROEHM & Davison, Woodbridge & Wayne Sts., Detroit, Mich.

ROGERS & Co., E. F., 410 Arch St., Philadelphia, Pa.

SCHERER & Co., H., Detroit, Mich.

SCHLEGEL Mfg. Co., College Ave. & N. Goodman St., Rochester, N. Y.

SHERWOOD, A. S., 754-56 Seventh Ave., New York, N. Y.

SHIRLEY Auto Fabric Co., 38-40 W. 32d St., New York, N. Y.

SLOANE, W. & J., Fifth Ave. & 47th St., New York, N. Y.

TEN EICK, Cornelius, 253 W. 47th St., New York, N. Y.

TIEL & Co., Geo., 413 Arch St., Philadelphia, Pa.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

WIESE & Co., Wm., 234 W. 55th St., New York, N. Y.

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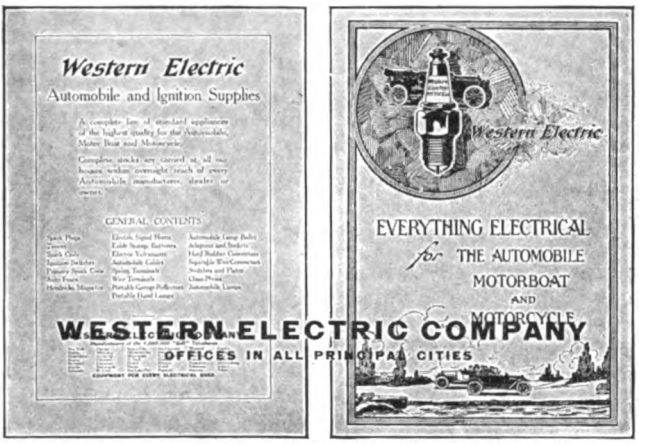

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TRIMMINGS (Continued)

METAL TRIMMINGS

(See also Fasteners, Curtain; also Fittings, Top: also Forgings, Drop; also Handles, Door; also Hinges, Door; also Locks, Door; also Irons, Slat; also Irons, Top; also Mouldings, Brass; also Rests, Bow; also Separators, Bow)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Scribner Ave. & Bowery St., Grand Rapids, Mich. (See page 209.)

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

COWLES & Co., C., New Haven, Conn. (See page 463.)

DOUGLAS & Lomason Co., Detroit, Mich. (See page 205.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

HIGGIN Mfg. Co., Newport, Ky.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. (See page 329.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MONARCH Carriage Goods Co., 2838-44 Spring Grove Ave., Cincinnati, O.

PHOENIX Lock Works, 331-37 Third Ave., Newark, N. J.

SHERWOOD, A. S., 754-56 Seventh Ave., New York, N. Y.

SMITH & Co., Jos. N., Detroit, Mich. (See page 203.)

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 327.)

WHITE Mfg. Co., 155 Cannon St., Bridgeport, Conn.

WING Co., Charles, Amesbury, Mass. (See page 397.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

TRUCKS

REPAIR TRUCKS

(For lying on when making repairs underneath a car)

AUTO Folding Sub-Car Co., 222 W. Muskingum Ave., Zanesville, O.

AUTO. & Accessories Mfg. Co., 816 W. North Ave., Baltimore, Md. "Norwood." (See page 335.)

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

E-Z ROLLER—See Rice & Dayton Mfg. Co.

FAW, J. H., 41 Warren St., New York, N. Y. (See page 281.)

FRENCH, F. A., Braddock Ave. & Guthrie St., Pittsburg, Pa. "Getunder."

GETUNDER—See French, F. A.

HERCULES—See La Porte Mat & Mfg. Co.

IDEAL—See Lewis-Geer Mfg. Co.

IDEAL Sheet Metal Works, 2809 Michigan Ave., Chicago, Ill. (See page 327.)

KEYSTONE Wire Matting Co., Beaver Falls, Pa.

LA PORTE Mat & Mfg. Co., La Porte, Ind. "Hercules."

LEWIS-GEER Mfg. Co., Ypsilanti, Mich. "Ideal"

MASCO—See Milwaukee Auto Specialty Co.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco." (See page 445.)

NORWOOD—See Auto. & Accessories Mfg. Co.

RICE & Dayton Mfg. Co., 115-19 E. Fourth St., Cedar Falls, Ia. "E-Z Roller."

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

TRUCKS AND CASTORS

WRECKING TRUCKS AND CASTORS

HOLMES & Bros., Robt., 40 N. Hazel St., Danville, Ill.

WEAVER Mfg. Co., Springfield, Ill.

TRUNKS

LEATHER, FABRIC AND BOARD TRUNKS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y.

AMERICAN Vulcanized Fibre Co., 500 Equitable Bldg., Wilmington, Del. "Vul-Cot." (See page 165.)

ATCO—See Auto Trunk Mfg. Co.

AUTO Trunk Mfg. Co., 94 Reade St., New York, N. Y. "Acto."

BAL, Wm., 14 Johnston St., Newark, N. J.

BELBER Trunk & Bag Co., 1641 N. Hancock St., Philadelphia, Pa.

BERG Auto Trunk & Specialty Co., 237-39 Lafayette St., New York, N. Y.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

DUPLEX—See Planet Co.

FARMERS Market Co., 711 Orange St., Wilmington, Del.

FITZGERALD Trunk Co., 1214 Wells St., Chicago, Ill.

FULLER Co., G. W., 182-84 Asylum St., Hartford, Conn.

HASKELL Bros., 109 N. Wabash Ave., Chicago, Ill.

INDESTRUCTO—See National Veneer Products Co.

KAMLEE Co., 247 Broadway, Milwaukee, Wis.

KING, W. A., 52 Public Sq., Cleveland, O.

KRONAUER & Co., Chas., 152 N. Desplaines St., Chicago, Ill.

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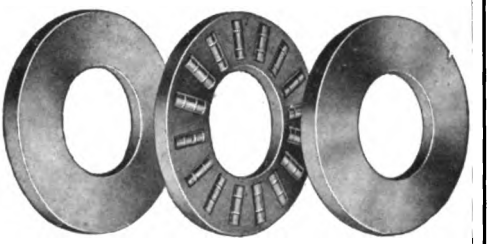

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The ONLY ball bearing combining the following important features: Full complement of balls; continuous, unbroken and full depth raceways.

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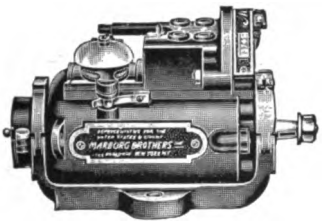

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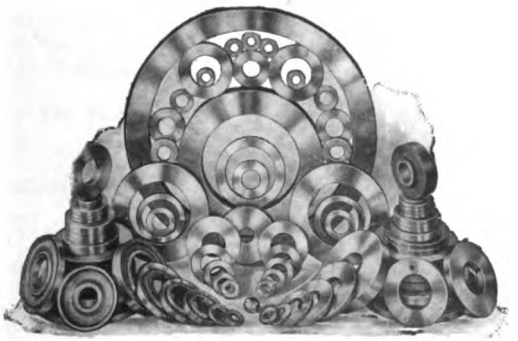

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TRUNKS (Continued)

LEATHER, FABRIC AND BOARD TRUNKS (Continued)

MORRISON & Co., L. E., 27 W. Washington St., Indianapolis, Ind.

NATIONAL Veneer Products Co., Mishawaka, Ind. "Indestructo."

PLANET Co., Westfield, Mass. "Duplex."

PROGRESS Trunk Mfg. Co., Philadelphia, Pa.

SAGE'S Trunk & Leather Goods Co., 134 Summer St., Boston, Mass.

STALLMAN, F. A., 57 E. Spring St., Columbus, O.

TAYLOR Trunk Works, C. A., 39 E. Randolph St., Chicago, Ill.

TUTTLE & Clark, Jefferson & Bates Sts., Detroit, Mich.

VUL-COT—See American Vulcanized Fibre Co.

WARREN Leather Goods Co., 80 Austin St., Worcester, Mass.

WINSHIP, W. W., 71 Summer St., Boston, Mass.

WOHLFELD Trunk & Bag Co., 538-40 N. Third St., Philadelphia, Pa.

METAL TRUNKS

A-Z Co., 530 W. 56th St., New York, N. Y.

IMPERIAL—See Welch & Suthergeren Co.

NATIONAL Enameling & Stamping Co., 374-78 Broadway, New York, N. Y. "Nesco."

NESCO—See National Enameling & Stamping Co.

WELCH & Suthergreen Co., 80 Lunenburg St., Fitchburg, Mass. "Imperial."

TUBES

INNER TUBES

(For Complete Tires—See Tires, Pneumatic)

ACME Rubber Mfg. Co., Trenton, N. J.

ADVANCE Tire Sales Co., 1733 Broadway, New York, N. Y. "Atlantic," "Columbia."

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O.

ATLANTIC—See Advance Tire Sales Co.

BATAVIA Rubber Co., Batavia, N. Y.

BRAENDER Rubber & Tire Co., Rutherford, N. J.

BRIARCLIFF—See Century Rubber Co.

BROWN Scientific Tube Co., Broadway & 72d St., New York, N. Y.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

BULL DOG—See Morgan & Marshall Rubber & Tire Co.

CENTURY Rubber Co., Plainfield, N. J. "Briarcliff," "Cre-Pa-Ra," "Wonder." (See page 407.)

COLUMBIA—See Advance Tire Sales Co.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Works, Erie, Pa. "Vitalic."

CONVERSE Rubber Shoe Co., Malden, Mass. "Tuff-E-Nuff."

COURTNEY, W. J., 1731 Broadway, New York, N. Y. (See page 425.)

CRE-PA-RA—See Century Rubber Co.

DAYTON Rubber Mfg. Co., 1204 Kiser St., Dayton, O. (See page 407.)

DE LUXE—See Thermoid Rubber Co.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ENDURANCE Tire & Rubber Co., New Brunswick, N. J.

ENGLEBERT Tyre Co., 1928 Broadway, New York, N. Y. (Importers).

FALLS Rubber Co., Cuyahoga Falls, O.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

FELLSEN Tire Co., 1995 Broadway, New York, N. Y.

FIRESTONE Tire & Rubber Co., Akron, O.

FISK & Dunham Rubber Co., American Mechanics Bldg., Trenton, N. J.

FISK Rubber Co., Chicopee Falls, Mass.

FRONTIER Tire & Rubber Co., 1054 Main St., Buffalo, N. Y.

GAULOIS Tire Corp., 49 W. 64th St., New York, N. Y. (Importers.) (See page 411.)

GLOBE—See United & Globe Rubber Mfg. Cos.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

GORDON Rubber Co., Canton, O.

GREENSBURG Tire & Rubber Co., W. Otterman and Depot Sts., Greensburg, Pa. "Isbest," "Pyramid," "Red Wing," "Silver Grey."

HAMILTON Rubber Mfg. Co., Trenton, N. J. "Perfection." (See page 425.)

HELIX Tube Co., 1733 Broadway, New York, N. Y.

HOME Tire Co., Trenton, N. J.

HOOD Rubber Co., Watertown, Mass. (See page 411.)

HOWE Rubber Co., New Brunswick, N. J.

IDEAL—See Voorhees Rubber Mfg. Co.

IMPERIAL—See McGraw Tire & Rubber Co.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

ISBEST—See Greensburg Tire & Rubber Co.

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa.

KNIGHT Tire & Rubber Co., Canton, O.

KOKOMO Rubber Co., Kokomo, Ind.

L. & M. Rubber Co., Chicago, Ill.

LEE Tire & Rubber Co., Conshohocken, Pa. "Velvet."

McGRAW Tire & Rubber Co., East Palestine, O. "Imperial."

MAC-WEB—See Webster-MacDonnell Co.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Tire & Rubber Co., Newman St., Mansfield, O.

MARATHON Tire & Rubber Co., Front St., Cuyahoga Falls, O.

MATTSON Rubber Co., Lodi, N. J. (See page 471.)

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Extra Thick Red Inner Tubes

THESE TUBES are made of fine high grade rubber and are guaranteed as to quality of material and workmanship.

Do not separate at the splice.

The rubber is dense, does not heat quickly and keeps to the original size after long usage.

W. J. COURTNEY
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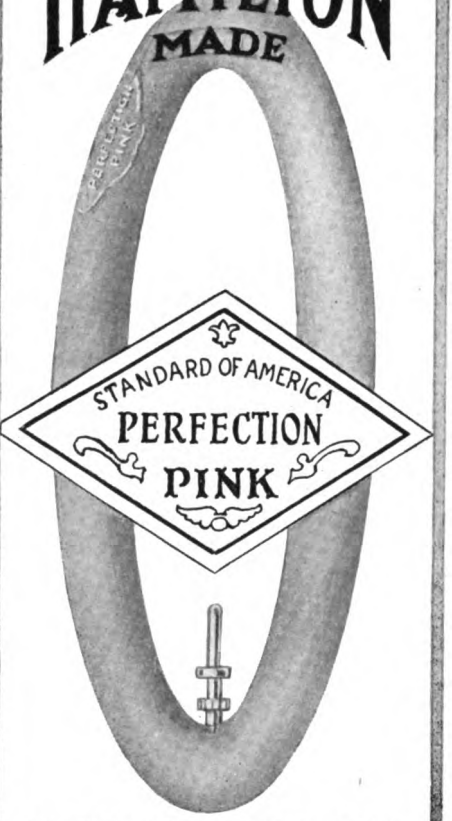

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PERFECTION PINK TUBES are never porous, are positively uniform in quality, everyone having been given the minutest inspection with the greatest care. **PERFECTION PINK TUBES** because of their high quality and excellent construction positively retain their size and shape so that unlike other tubes, they do not stretch and make their reinsertion difficult.

We still have some unoccupied territory which will prove highly profitable to the right representatives, for here is indeed the tube that has been looked for, **the better tube at a little better price.**

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TRENTON, N. J.

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TUBES (Continued)

INNER TUBES (Continued)

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

MILTON Tire & Rubber Co., 326 A St. (S. Boston), Boston, Mass.

MODEL—See Voorhees Rubber Mfg. Co.

MOHAWK Rubber Co., Akron, O.

MORGAN & Marshall Rubber & Tire Co., East Liverpool, O. "Bull Dog."

NASSAU—See Thermoid Rubber Co.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NORTHLAND Rubber Co., 703-11 Northland Ave., Buffalo, N. Y. "Red Jacket."

PACKARD—See Pharis Tire & Rubber Co.

PATTERSON Rubber Co., Lowell, Mass.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

PERFECTION—See Hamilton Rubber Mfg. Co.

PERFECTION Auto Tube Co., 1622 Broadway Denver, Colo.

PHARIS Tire & Rubber Co., W. Main St., Newark, O. "Packard."

PORTAGE Rubber Co., Akron, O.

PYRAMID—See Greensburg Tire & Rubber Co.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

RACINE Rubber Co., Racine, Wis. (See page 409.)

RED JACKET—See Northland Rubber Co.

RED WING—See Greensburg Tire & Rubber Co.

REPUBLIC Rubber Co., Youngstown, O.

ROME Hollow Wire & Tube Co., Rome, N. Y.

RUTHERFORD Rubber Co., Rutherford, N. J. "Sterling."

SAVAGE Tire Co., Main & Sicard Sts., San Diego, Cal.

SEAMLESS Rubber Co., New Haven, Conn.

SEDRALA—See Semple Rubber Co.

SEMPLE Rubber Co., 112 Murray St., Trenton, N. J. "Sedrala."

SILVER GREY—See Greensburg Tire & Rubber Co.

SLADE Mfg. Co., Providence, R. I.

STERLING—See Rutherford Rubber Co.

TEN Broeck Tyre Co., 840 S. 26th St., Louisville, Ky.

THERMOID Rubber Co., Trenton, N. J. "De Luxe," "Nassau." (See page 55.)

TRIPLEX Tube Co., 60 State St., Boston, Mass.

TUFF-E-NUFF—See Converse Rubber Shoe Co.

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

UNITED & Globe Rubber Mfg. Cos., Trenton, N. J. "Globe."

VELVET—See Lee Tire & Rubber Co.

VICTOR Rubber Co., Springfield, O.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. "Model," "Ideal." (See page 355.)

VITALIC—See Continental Rubber Works.

WEBSTER-MACDONNELL Co., 98 Washington St., Haverhill, Mass. "Mac-Web."

WONDER—See Century Rubber Co.

ZEE Zee Tire & Rubber Co., 33d & Walnut Sts., Philadelphia, Pa.

SPEAKING TUBES

(For Limousine Telephones—See Telephones, Limousine: For Annunciators—See Annunciators)

BRIDGEPORT Coach Lace Co., 1731-37 Broadway, New York, N. Y. (See page 351.)

COLUMBIA—See Horstmann Co.

COWLES & Co., C., New Haven, Conn. (See page 463.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia."

LAW Engineering & Specialty Mfg. Co., Rochester, N. Y.

PERPENTE Mfg. Co., State & Wall Sts., New Haven, Conn.

SCHLEGEL Mfg. Co., College Ave. & N. Goodman St., Rochester, N. Y.

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

TUBING

ALUMINUM TUBING

ALUMINUM Co. of America, Pittsburg, Pa.

IVINS Tube Works, Elwood, Oak Lane Station, Philadelphia, Pa.

BRASS AND COPPER TUBING

AMERICAN Brass Co. (Ansonia Brass & Copper Branch), Ansonia, Conn.

AMERICAN Brass Co. (Benedict & Burnham Branch), Waterbury, Conn.

AMERICAN Brass Co. (Coe Brass Branch), Torrington, Conn.

AMERICAN Brass Co. (Kenosha Branch), Kenosha, Wis.

AMERICAN Tube Works, 10 Oliver St., Boston, Mass.

BARCALO Mfg. Co., Buffalo, N. Y. (See page 555.)

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 319.)

CHASE Rolling Mill Co., Waterbury, Conn.

CORNELIS & Gridley, Wolcott St., Waterbury, Conn.

DETROIT Copper & Brass Rolling Mills, Clark Ave. below Wabash R. R., Detroit, Mich.

ERIE-BUFFALO Tube Co., 18th & Cranberry Sts., Erie, Pa. (See page 425.)

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METAL STAMPINGS

To Order On Contract

Electric Welding

McDOWELL MFG. COMPANY

541 WOOD STREET
PITTSBURGH, PA.

Seamless Steel TUBING

For Automobile and Mechanical Construction.

STEEL AND IRON

for all special purposes.

Great assortment and large stock carried.

E. K. Morris & Co.

311-313-315-317 W. 2d St.

CINCINNATI, Ohio

"DETROIT"

Cold Drawn Seamless Steel MECHANICAL TUBING

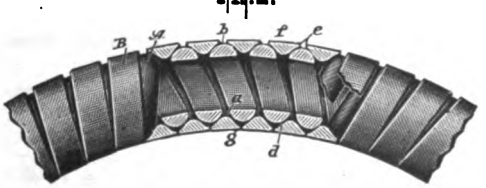
For Axles—Steering Gears—Torsion Tubes—Spacers, Etc.

DETROIT SEAMLESS STEEL TUBES CO.

DETROIT, MICH.

BEST SPEEDOMETER SERVICE
WHEN ALMOND CASING PROTECTS THE SHAFT

Fig. 2.



ALMOND FLEXIBLE SPEEDOMETER CASING.
NOTE THE SUBSTANTIAL CONSTRUCTION.

Jar, Rust and Strain Proof. Affords Proper and Positive Protection to Shaft under all conditions.

ALMOND FLEXIBLE TUBING

FOR CONVEYING
OIL, GASOLINE, PREST-O-LITE GAS AND GREASE.

T. R. ALMOND MFG. CO.

1 MAPLE AVE., ASHBURNHAM, MASS.

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TUBING (Continued)

BRASS AND COPPER TUBING (Continued)

FRENCH Mfg. Co., 142 Robbins St., Waterbury, Conn.

HORN Co., M. T., 82-86 Park Pl., New York, N. Y.

IVINS Tube Works, Elwood, Oak Lane Station, Philadelphia, Pa.

MACKENZIE-WALTON Co., Pawtucket, R. I.

MICHIGAN Copper & Brass Co., 1611 Jefferson Ave. W., Detroit, Mich. "Wolverine."

NATIONAL Brass & Copper Tube Co., 41 Park Row, New York, N. Y.

NEW Jersey Tube Co., Newark, N. J.

RANDOLPH-CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

ROME Hollow Wire & Tube Co., Rome, N. Y.

STANDARD Brass & Copper Tube Co., Woodbridge & Division Sts., New London, Conn.

UNIFORM Seamless Wire Co., 71 Peck St., Providence, R. I.

UNITED Wire & Supply Co., 109 Summer St., Providence, R. I.

WATERBURY Mfg. Co., Waterbury, Conn.

WELLS & Co., A. H., Watertown Rd., Waterbury, Conn.

WOLVERINE—See Michigan Copper & Brass Co.

COPPER TUBING

(See Tubing, Brass and Copper)

FIBRE TUBING

(See Fibre, Hard)

FLEXIBLE METALLIC TUBING

ADVANCE—See Interlocked Metallic Hose Co.

ALMOND Mfg. Co., T. R., 1 Maple Ave., Ashburnham, Mass.
(See page 427.)

AMERICAN Metal Hose Co., Waterbury. Conn.

ATLANTIC Tubing Co., 1756 Cranston St., Providence, R. I.

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y. "Rubes."

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

CHICAGO Tubing & Braiding Co., 216-24 N. Clinton St., Chicago, Ill.

COATES Clipper Mfg. Co., 237 Chandler St., Worcester, Mass.

DUOFLEX—See Fischer Spring Co.

FISCHER Spring Co., Chas., 88-90 Walker St., New York, N. Y. "Duoflex."

INTERLOCKED Metallic Hose Co., Orchard & Scott Sts., Newark, N. J. "Advance."

LOMBARDI Motor Car Co., 67-71 Minerva St., Derby, Conn.

METAL Hose & Tubing Co., 17 Battery Pl., New York, N. Y. "Triplexd."
(See page 321.)

PENNFLEX—See Pennsylvania Flexible Metallic Tubing Co.

PENNSYLVANIA Flexible Metallic Tubing Co., Broad & Race Sts., Philadelphia, Pa. "Pennflex."

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

RUBES—See Automobile Supply Mfg. Co.

STANDARD Metal Mfg. Co., Newark, N. J.
(See page 213.)

TRIPLEXD—See Metal Hose & Tubing Co.

U. S. Flexible Metallic Tubing Co., 450 E. Third St., Los Angeles, Cal.

WEBB Mfg. Co., ft. Center St., Newark, N. J.
(See page 69.)

HARD RUBBER TUBING

(See Rubber, Hard)

IRON-LINED BRASS TUBING

PHENIX Tube Co., 182 N. 11th St., Brooklyn, N. Y.

ROME Mfg. Co., Railroad St., Rome, N. Y.

SOFT RUBBER TUBING

ACME Rubber Mfg. Co., Trenton, N. J.

ATLANTIC Tubing Co., 1756 Cranston St., Providence, R. I.

BOSTON Belting Co., 84 Linden Park St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CANFIELD Rubber Co., Bridgeport, Conn.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 139.)

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Works, Erie, Pa.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

FEDERAL Rubber Mfg Co., Milwaukee, Wis.

GOODRICH Co., B. F., Akron, O.

HAMILTON Rubber Mfg. Co., Trenton, N. J.
(See page 425.)

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.
(See page 415.)

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

LIBERTY & Nicholls Mfg. Co., East Norwalk, Conn.

MATTSON Rubber Co., Lodi, N. J.
(See page 471.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

MILFORD Rubber Works, Milford, Ill.

MILLER Rubber Co., Akron, O.

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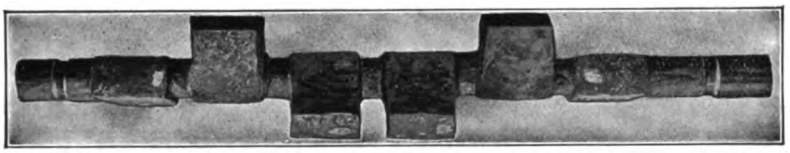
GILL FORGED CRANK-SHAFTS

The P. H. Gill & Sons Forge and Machine Works, Lorraine and Otsego Streets, Brooklyn, N. Y. We wish to call the Trade's attention to our L. K. Nickel Steel Crank-shafts and Gear Blanks, etc., Domestic and Foreign. Chrome Nickel Steel and Vanadium Steel.

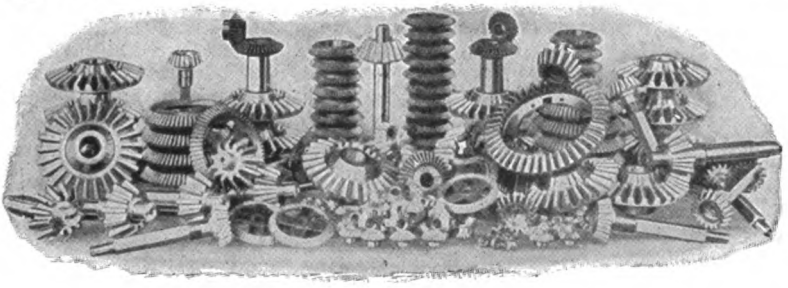
NO DROP FORGINGS

We have special **adapted Crank Pin Machines for making Crank-shafts, true-round within one-quarter-thousandth of an inch.** We also make axles complete, finished or forged only; also all kinds of automobile and marine forgings.
Crank-shafts up to 6″ diam. All anvil-forged, hammered out of Acid O. H. Steel or Nickel Steel or Chrome Nickel Steel.



This Trade-Mark Insures To You

HIGH-GRADE GEARS FOR EVERY KIND OF SERVICE



We produce in quantity and manufacture complete or cut to specifications Gears and Pinions of every description. Our output includes Spurs, Bevels, Mitres, Spirals and Worms. On large and small orders we guarantee prompt deliveries.

Send us your specifications and get our prices.

THE VAN DORN & DUTTON CO. GENERAL OFFICES AND FACTORIES CLEVELAND

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TUBING (Continued)

SOFT RUBBER TUBING (Continued)

MINERALIZED Rubber Co., 165 Chambers St., New York, N. Y.

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PARKER, Stearns & Co., 286 Sheffield Ave., Brooklyn, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn.

STANDARD Rubber & Cable Co., Bridgeport, Conn.

THERMOID Rubber Co., Trenton, N. J.
(See page 55.)

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.
(See page 355.)

STEEL TUBING

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

BECKER Steel Co. of America, 90 West St., New York, N. Y. (Importers.)

DELAWARE Seamless Tube Co., Auburn, Pa.

DETROIT Seamless Steel Tubes Co., Detroit, Mich.
(See page 427.)

FIELD & Co., 723 Arch St., Philadelphia, Pa. (Distributors.)
(See page 489.)

FRASSE & Co., Peter A., New York, N. Y. (Distributors.)
(See page 219.)

GLOBE Seamless Steel Tubes Co., 33d Ave. & Burnham St., Milwaukee, Wis.

IVINS Tube Works, Elwood, Oak Lane Station, Philadelphia, Pa.

KRUPP—See Prosser & Son.

MORRIS & Co., E. K., 311-17 W. Second St., Cincinnati, O. (Distributors.)
(See page 427.)

NASH Co., George, 217 Pearl St., New York, N. Y. (Distributors.)
(See page 489.)

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa. "Shelby."

OHIO Seamless Tube Co., Shelby, O.

PITTSBURG Seamless Tube Co., Beaver Falls, Pa.

PITTSBURGH Steel Products Co., Frick Annex, Pittsburg, Pa.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 381.)

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y. (Distributors.)
(See page 507.)

SHELBY—See National Tube Co.

STANDARD Steel Tube Co., Toledo, O.

STANDARD Welding Co., Cleveland, O. "Stanweld."
(See Book Mark.)

STANWELD—See Standard Welding Co.

WARD'S Sons, Edgar T., 25 Purchase St., Boston, Mass. (Distributors.)
(See page 489.)

TURN-BUCKLES

WROUGHT TURN-BUCKLES

CLEVELAND Hardware Co., Cleveland, O.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

DETROIT Screw Works, Detroit, Mich.
(See page 341.)

EBERHARD Mfg. Co., 2734 Tennyson Rd., Cleveland, O.

HASKELL Mfg. Co., Wm. H., 24 Commerce St., Pawtucket, R. I.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

MERRILL Bros., Maspeth, N. Y.

MICHIGAN Bolt & Nut Co., ft. Meldrum Ave., Detroit, Mich.

NEW England Bolt & Steel Co., Bowdoin St. (Everett), Boston, Mass.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Lafayette St., Detroit, Mich.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.

WILCOX, Crittenden & Co., 283 Main St., Middleton, Conn.

TURNTABLES

AUTOMOBILE TURNTABLES

(See also Castors and Wheel Trucks).

BEACH Auto Turntable Co., T. C., 313 Lansing St., St. Johns, Mich.

BICYCLE Step Ladder Co., 6 W. Randolph St., Chicago, Ill. "Murray."

CANTON Foundry & Machine Co., Canton, O. "Universal."
(See page 473.)

ELLIOTT Co., Sterling, Newton, Mass.

ERNST'S Sons, C. F., 75 Lathrop St., Buffalo, N. Y.

LANSING Co., Lansing, Mich.

LINK-BELT Co., 39th St. & Stewart Ave., Chicago, Ill.
(See page 155.)

MURRAY—See Bicycle Step Ladder Co.

NICOLS & Bro., George P., Old Colony Bldg., Chicago, Ill.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

PERFECTION—See Zering Mfg. Co.

PITLESS Auto Turntable Co., 1316 W. Ninth St., Kansas City, Mo.

PORTLAND Garage Co., 49-51 Cross St., Portland, Me.

SMITH Iron Co., G. W. & F., Gerard St., Boston, Mass.

TURNER Machine Co., 28-32 Maple Ave., Danbury, Conn.

UNITED Casting Co., Wilson & Violet Sts., Los Angeles, Cal.

UNIVERSAL—See Canton Foundry & Machine Co.

ZERING Mfg. Co., H., 522-30 Reading Rd., Cincinnati, O. "Perfection."

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SUSPENSION BALL BEARINGS

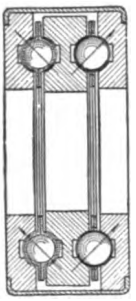
"Made in America"

Single and Double Row Radial Bearings

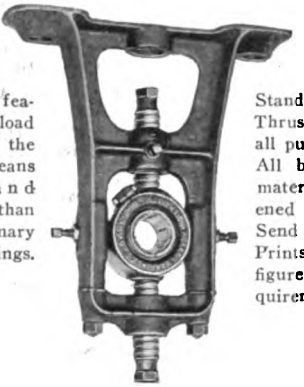
Plain and Grooved Thrust Bearings

FOR

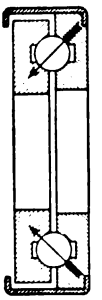
Shaft Bearings—Automobile Bearings—Machinery, Etc.



The suspension feature distributes load on two-thirds of the balls, which means less friction and greater strength than that of the ordinary type of ball bearings.



Standard and Special Thrust Bearings for all purposes.
All bearings of best material, case hardened or tempered.
Send us your Blue Prints and let us figure on your requirements.



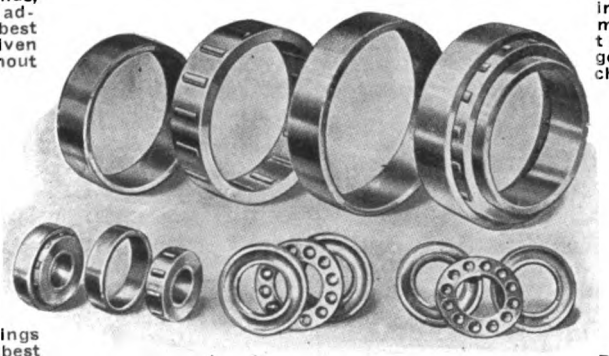
WRITE FOR CATALOG AND PRICES.

Suspension Ball Bearing Company
SANDUSKY, OHIO

STANDARD
MACHINERY COMPANY'S
Ball BEARINGS Roller

We make both kinds, and can advise the best for any given work, without bias.

Journal and Thrust Bearings for automobile, motor truck and general machine service.



Our Bearings are the best that can be made, and will stand up under the severest tests.

Don't fail to see us about your Bearing problems: Quality, price and delivery.

Standard Machinery Co., Auburn, Rhode Island

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TWINE

TUFTING TWINE

MEYER & Co., John C., Lowell, Mass.

TRAVERS Twine & Cordage Co., 81 Warren St., New York, N. Y.

UNIONS

PIPE UNIONS

(See Fittings, Pipe)

TUBING UNIONS

CRUM-WILEY Mfg. Co., Peru, Ind.

DOLE Valve Co., 208 N. Fifth Ave., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

LAVIGNE Mfg. Co., 625-41 Commonwealth Ave., Detroit, Mich.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McRAE & Roberts Co., 211-35 Campbell Ave., Detroit, Mich.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis. "Union Cinch."

ROBERTS Brass Mfg. Co., 1395-1407 Fort St., W., Detroit, Mich.

UNION CINCH—See Richardson-Phenix Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WILLIAMS Valve Co., D. T., Spring Grove Ave., & Township St., Cincinnati, O.

ZERK Mfg. Co., Cleveland, O.

VALVES

ANGLE, GLOBE, CHECK AND GATE VALVES

BASHLIN Co., Warren, Pa.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CRANE Co., 836 S. Michigan Ave., Chicago, Ill.

DETROIT Brass Works, 3000 Brooklyn Ave., Detroit, Mich.

DETROIT Lubricator Co., Detroit, Mich.
(See page 245.)

JARECKI Mfg. Co., Erie, Pa.

JENKINS Bros., 80 White St., New York, N. Y.

KELLY & Jones Co., Greensburg, Pa.

KENNEDY Valve Mfg. Co., Elmira, N. Y.

KINSEY & Mahler Co., 400 S. Adams St., Peoria, Ill.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McDONALD Mfg. Co., A. Y., Dubuque, Ia.

McNAB & Harlan Mfg. Co., 55 John St., New York, N. Y.

MILWAUKEE Valve Co., 139 Burrell St., Milwaukee, Wis.

PITTSBURG Valve Foundry & Construction Co., 26th St. & A. V. Ry., Pittsburg, Pa.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

STEPHENS Mfg. Co., Roe, Clayton & Parkinson Aves., Detroit, Mich.

WALWORTH Mfg. Co., Boston, Mass.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

AUTOMATIC FUEL SHUT-OFF VALVES

(For turning off fuel in case of fire)

UNDERWRITERS Valve Co., Industrial Trust Bldg., Providence, R. I.

BALL CHECK VALVES

CRUM-WILEY Mfg. Co., Peru, Ind.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
(See page 329.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

GAS ENGINE VALVES

(For Valves in the rough—See Forgings, Drop)

ELECTRIC Welding Products Co., Cleveland, O.
(See page 592.)

LEWIS Electric Welding & Mfg. Co., 4080 Detroit Ave., Toledo, O.
(See page 501.)

MICHIGAN Engine Valve Co., Detroit, Mich.
(See page 433.)

MIDDLEDITCH, Benj., 91-103 Meldrum Ave., Detroit, Mich.

MORGAN Mfg. Co., John St., Newport, R. I.

RICH Tool Co., 410 Railway Exchange, Chicago, Ill.

SCHLIEDER Mfg. Co., 45 Fort St., E., Detroit, Mich.
(See page 433.)

GASOLINE LOCK VALVES

BRADLEY Safety Auto Lock Co., 532 Barclay Blk., Denver, Colo.

ESCO Mfg. Co., 1580 Woodward Ave., Detroit, Mich.

GASOLOCK—See Headlight Support Co.

GLOBE Auto Lock Co., Canisteo, N. Y.

Complete Index to Classification appears on Pages 8 to 26.

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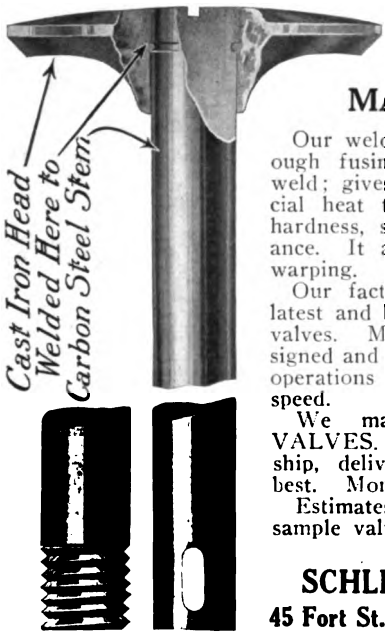
THE HIGH QUALITY VALVES

Last month we made 105,815 valves for our customers.



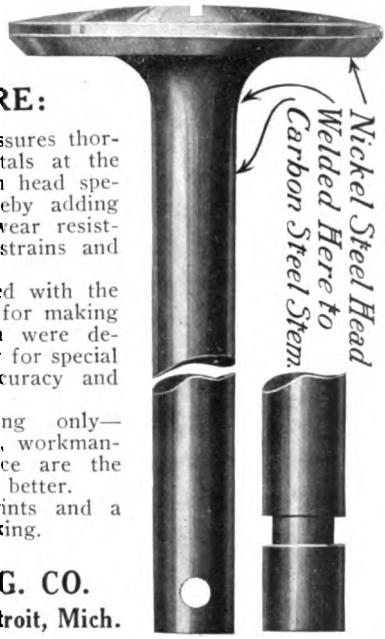
WE CAN MAKE MORE:

Our welding process assures thorough fusing of the metals at the weld; gives the cast iron head special heat treatment thereby adding hardness, strength and wear resistance. It also prevents strains and warping.

Our factory is equipped with the latest and best machines for making valves. Many of which were designed and built purposely for special operations to secure accuracy and speed.

We make one thing only—VALVES. The material, workmanship, deliveries and price are the best. Money can't buy better.

Estimates on blue prints and a sample valve for the asking.



SCHLIEDER MFG. CO.

45 Fort St. E., Detroit, Mich.

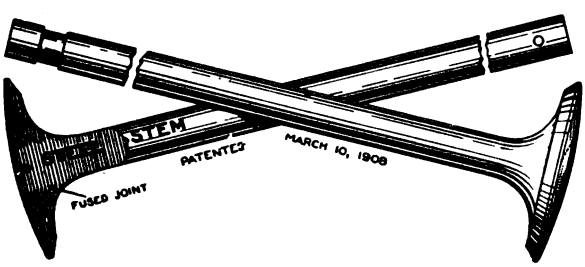
The RUSHMORE STARTING and LIGHTING SYSTEM

The only completely automatic electric starter having no intermediate gears. Highest efficiency—lightest weight—longest life.

The only lighting dynamo that governs its own output without moving parts.

Rushmore electric and gas lamps and generators

RUSHMORE DYNAMO WORKS, Plainfield, N. J.



MOTOR VALVES

is our specialty

GRAY IRON HEADS Fused

its entire length of contact with the steel stem.

EVERY VALVE GUARANTEED

We make the *rough blanks* or *valves finished* complete.

Send us your blue prints for estimates.

MICHIGAN ENGINE VALVE CO.

DETROIT, MICH.

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VALVES (Continued)

GASOLINE LOCK VALVES (Continued)

HEADLIGHT Support Co., 728 Woodward Ave., Detroit, Mich. "Gasolock."

HILL—See Janney, Steinmetz & Co.

HILL—See Norwalk Iron Works Co.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Hill."
(See page 399.)

McRAE & Roberts Co., 211-35 Campbell Ave., Detroit, Mich.

NORWALK Iron Works Co., South Norwalk, Conn. "Hill."

PROTECT-U—See Security Auto Lock Co.

SECURITY Auto Lock Co., 1733 Broadway, New York, N. Y. "Protect-u."

WILLSTAD Mfg. Co., 6717 Sangamon St., Chicago, Ill.

GATE VALVES

(See Valves, Angle)

GLOBE VALVES

(See Valves, Angle)

MIXING VALVES

(See Vaporizers)

MUFFLER CUT-OUT VALVES

APCO—See Auto Parts Co.

AUTO Parts Co., 702 Eddy St., Providence, R. I. "Apco."

BARCO Brass & Joint Co., 212-22 W. Illinois St., Chicago, Ill.

DUNKIRK Corporation, Dunkirk, N. Y.

EMPIRE—See S. B. R. Specialty Co.

ESSEX—See S. B. R. Specialty Co.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

G. P.—See Piel Co.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich.

HANDY—See Lunkenheimer Co.

HEBERT Mfg. Co., Franklin, N. H.

INTERNATIONAL Automobile Supply Co., 117 W. South Water St., Chicago, Ill.

LINCOLN Machine Shops, Lincoln, Ill.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O. "Handy."

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium."
(See page 445.)

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PIEL Co., G., 13th St. & Boulevard, Long Island City, N. Y. "G. P."

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y.
(See page 435.)

RADIUM—See Milwaukee Auto Specialty Co.

RUDIE—See Western Brass Mfg. Works.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Essex," "Empire."

STANHOPE Forge & Machine Works, 49-51 Lansdowne St., Cambridge, Mass.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STRYKER, C. W., 240 Shonnard St., Syracuse, N. Y.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. "Rudie."
(See page 327.)

YANKEE Co., 69 Genesee St., Utica, N. Y.

NEEDLE VALVES

AMERICAN Brass & Iron Co., Detroit, Mich.
(See page 83.)

DETROIT Brass Works, 2000 Brooklyn Ave., Detroit, Mich.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

PRESSURE REGULATING VALVES

(See Regulators, Pressure)

STEAM SAFETY VALVES

AMERICAN Steam Gauge & Valve Mfg. Co., 220 Camden St., Boston, Mass.

ASHTON Valve Co., 271 Franklin St., Boston, Mass.
(See page 499.)

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

STEPHENS Mfg. Co., Roe, Clayton & Parkinson Aves., Detroit, Mich.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

STEAM THROTTLE VALVES

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

TIRE VALVES

ATLAS Auto Supply Co., 3240 W. Lake St., Chicago, Ill. "Day."
(See page 131.)

BURKE Valve Co., 5213 Windsor Ave., Cleveland, O.

DAY—See Atlas Auto Supply Co.

ST. LOUIS Pneumatic Valve Co., 2520-26 N. Spring Ave., St. Louis, Mo.

SCHRADER'S Son, A., 783-91 Atlantic Ave., Brooklyn, N. Y.
(See page 435.)

STEVENS Mfg. & Supply Co., Fischer Bldg., Chicago, Ill.

Complete Index to Classification appears on Pages 8 to 26.

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SCHRADER
Universal

Tire Pressure Gauge
Price, $1.00

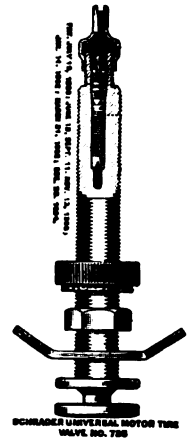
YOU cannot run your car with any old air pressure in the tires and expect the tires to last. Tires are built to withstand a definite and specified air pressure. You can only get maximum service when you inflate them to the exact air pressure needed, and maintain that specific pressure at all times.

A Schrader Universal Tire Pressure Gauge will tell exactly what pressure you carry in your tires. Kicking the tire won't tell you and guessing won't do. Nearly right isn't enough, the pressure must be exactly right.

For sale by Tire Manufacturers, Jobbers, Dealers, Garages, or

A. Schrader's Son,
Inc.
783-791 Atlantic Ave.,
BROOKLYN N. Y.

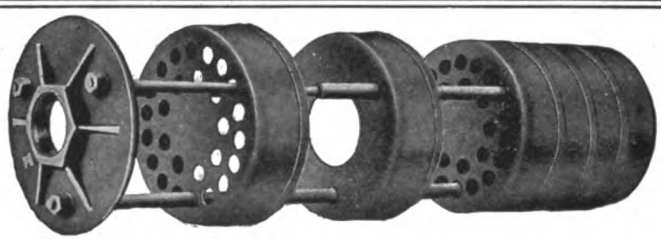
SCHRADER
Universal
VALVES



Are the regular equipment of 9/10 of all automobile and bicycle tires made in the United States.

"There's a Reason"

Powell Pressed Steel Muffler



WE manufacture Mufflers of the following diameters: 5 inch, 6 inch and 6¾ inch and we use the number of sections necessary to properly muffle the different size motors that are on the market.

5 inch diameter Mufflers are stamped from 20 gauge steel
6 " " " " " " 18 " "
6¾ " " " " " " 16 or 18 gauge steel.

This muffler is made up of a succession of pressed steel cups drawn from sheet metal. Each cup is shouldered so that it overlaps the bottom of the succeeding one by one-fourth of an inch.

The end plates are malleable iron, with pipe or flange connection.

The perforations are around the outer edge of each baffling plate with an additional one in the center of the first few, the area of these holes varying with the size of the engine to be muffled.

The POWELL MUFFLER is *standard equipment on 36 of the best AMERICAN made automobiles and trucks*, which is ample proof of its efficiency and durability.

Powell Muffler & Timer Co.
42 La Fayette Street Utica, N. Y.

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VALVES (Continued)

TIRE SAFETY VALVES

ARTIZAN Brass Co., 218 N. Jefferson St., Chicago, Ill.

SALUS—See Sioux City Machine & Tool Co.

SIOUX City Machine & Tool Co., First & Virginia Sts., Sioux City, Ia. "Salus."

TWO WAY TANK VALVES

(Fuel Reserve Valves or Cocks)

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

IDEAL Brass Works, Tenth & Canal Sts., Indianapolis, Ind.

IMPERIAL Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. (See page 329.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O. "Quadlock."

QUADLOCK—See Lunkenheimer Co.

VANADIUM

AMERICAN Vanadium Co., Vanadium Bldg., Pittsburg, Pa.

VAPORIZERS

GASOLINE VAPORIZERS OR MIXING VALVES

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O. "Nonpareil."

NONPAREIL—See Lunkenheimer Co.

WILKINSON Co., Wm. H., West Medway, Mass.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

VARNISHES

AKRON Varnish Co., Akron, O.

AMERICAN Varnish Co., 1138 N. Branch St., Chicago, Ill.

ANGLO - AMERICAN Varnish Co., 53-63 Johnson St., Newark, N. J.

ARMITAGE & Co., John L., Newark, N. J.

ATLANTIC Varnish Works, Richmond, Va.

AULT & Wilborg Co., New, Seventh & Culvert Sts., Cincinnati, O.

BAY STATE—See Wadsworth, Howland & Co.

BECKWITH-CHANDLER Co., 320 Fifth Ave., New York, N. Y.

BERRY Bros., Detroit, Mich.

BILLINGS-CHAPIN Co., Cleveland, O.

BOSTON Varnish Co., Everett, Mass.

BROOKS & Co., Clarence, 249-77 Chestnut St., Newark, N. J.

BUCKEYE Paint & Varnish Co., 15th & Lucas Sts., Toledo, O.

BULLS-EYE—See Zinsser & Co.

CHASE, Roberts & Co., Fifth St. & West Ave., Long Island City, N. Y. "Kismet."

CHI-VAR-CO—See Chicago Varnish Co.

CHICAGO Varnish Co., 2100 Elston Ave., Chicago, Ill. "Chi-Var-Co."

CINCINNATI Varnish Co., 211 South St., Cincinnati, O.

CLEVELAND Varnish Co., 2111 E. 87th St., Cleveland, O. "Frelastic."

COLUMBUS Varnish Co., Columbus, O. (See page 281.)

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

ELMENDORF Varnish Co., 845 Larrabee St., Chicago, Ill.

EMPIRE Varnish Co., 2638-42 E. 76th St., Cleveland, O.

FLINT Varnish Works, Flint, Mich.

FLOOD & Conklin Co., 136 Chestnut St., Newark, N. J. "Radium."

FOREST City Paint & Varnish Co., 2324 Lakeside Ave., Cleveland, O.

FRELASTIC—See Cleveland Varnish Co.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GILLESPIE & Son, Chas. H., 19 Dey St., Jersey City, N. J.

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

GRAVES Co., N. Z., 22-26 S. Third St., Philadelphia, Pa.

GREGG Varnish Co., St. Louis, Mo.

HARLAND & Son, Wm., Genesee St. & Erie Canal, Buffalo, N. Y. "Whitest."

HILDRETH Varnish Co., 90 West St., New York, N. Y.

HOTOPP Varnish Co., First & Marshall Sts., Hoboken, N. J.

KISMET—See Chase, Roberts & Co.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

MASURY & Son, John W., New York, N. Y.

MOLLER & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.

MOORE & Co., Benjamin, 231-33 Front St., Brooklyn, N. Y.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

PARROTT Varnish Co., 453 N. Washington Ave., Bridgeport, Conn.

PAYSON Varnish Co., 141st St. & Walnut Ave., New York, N. Y.

PRATT & Lambert, Buffalo, N. Y.

QUEEN City Varnish Co., Cincinnati, O.

RADIUM—See Flood & Conklin Co.

RICKER-BENNETT Co., 37 Harris St. (N. Cambridge), Cambridge, Mass.

SCHRACK & Co., C., 152 N. Fourth St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

Complete Index to Classification appears on Pages 8 to 26.

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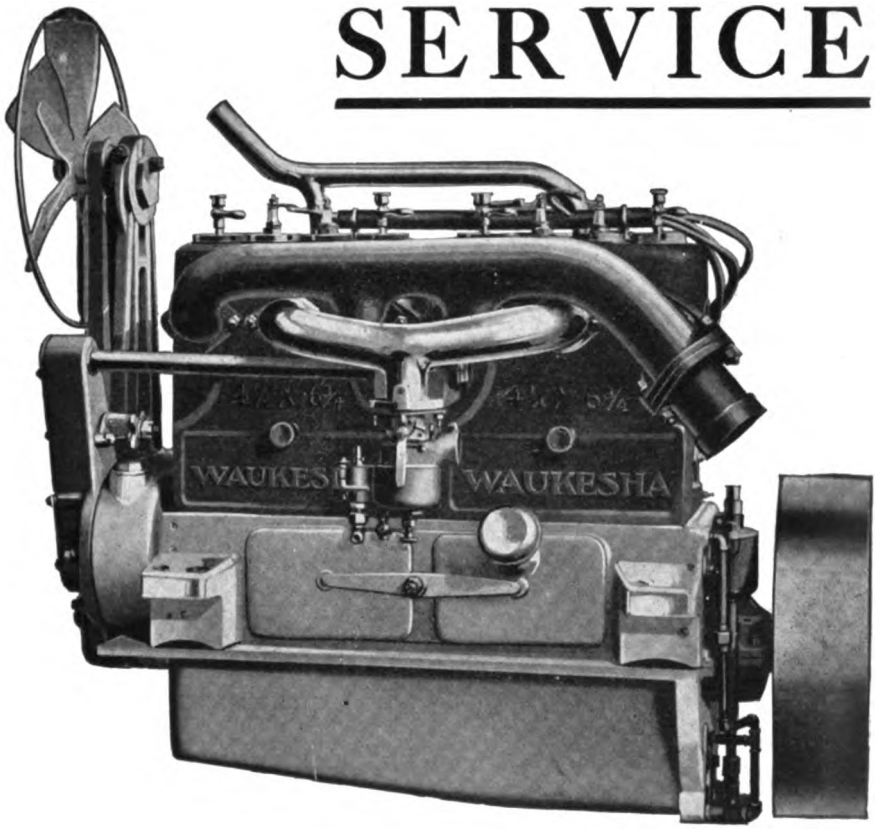
WAUKESHA

SERVICE



Stop and think before you adopt a motor. Waukesha Service means this.

Your customers will have small repair bills. Our repair business is 8% of our whole business. Replacement on our guarantee is only ½ of 1 per cent. Shipment of repairs for over two years indicate the following facts,—

80% of all repair orders shipped same day received. 15% on second day 5% thereafter, for various reasons.

Waukesha Motors are not sold at cost price to foster a large future repair business.

You pay an honest price for your motor and that ends your expense.

Compare these fundamental facts with others before you buy.

Waukesha Motors manufactured in these sizes:

3¾ x 5¾	4½ x 5¾	4½ x 6¾
4¼ x 5¾	4¼ x 6¾	4¾ x 6¾

WAUKESHA MOTOR CO.

WAUKESHA WISCONSIN

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VARNISHES (Continued)

SMITH & Co., Edward, Sixth St. & West Ave., Long Island City, N. Y.

STANDARD Varnish Works (Elm Park), Port Richmond, N. Y.

STEWART-MOWRY Co., 3214 Shields Ave., Chicago, Ill.

STULB Varnish Co., Joseph, Haddon Ave. & White Horse Pike, Camden, N. J.

VALENTINE & Co., 456 Fourth Ave., New York, N. Y. "Vanadium."

VANADIUM—See Valentine & Co.

WADSWORTH, Howland & Co., 84 Washington St., Boston, Mass. "Bay State."

WHEELER Varnish Works, 2260 Elston Ave., Chicago, Ill.

WHITEST—See Harland & Son.

ZINSSER & Co., W., 195 William St., New York, N. Y. "Bulls-Eye."

VENTILATORS

LIMOUSINE AND FORE DOOR VENTILATORS

COWLES & Co., C., New Haven, Conn.
(See page 463.)

DOUGLAS & Lomason Co., Detroit, Mich.
(See page 205.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 87.)

GEMCO—See Garage Equipment Mfg. Co.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 163.)

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 203.)

TROY Auto Specialty Co., Troy, N. Y.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 327.)

WIND SHIELD VENTILATORS

MORRIS Hardware Co., Connellsville, O. "Ventor."

SECURITY Co., 30 Shingiss St., Pittsburg, Pa.

VENTOR—See Morris Hardware Co.

VOLTMETERS

(See Ammeters; also Gauges, Battery)

VULCANIZERS

PORTABLE VULCANIZERS

ADAMSON Mfg. Co., East Palestine, O. "Universal."

AUTO Steam Vulcanizer Co., Cincinnati, O.

AUTOMATIC Device Co., 551 E. Jefferson St., Frankfort, Ind. "Economy."

BADGER—See Tire Repair Equipment Co.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

DIAMOND Mfg. Co., Equitable Bldg., Des Moines, Ia.

ECONOMY—See Automatic Device Co.

ECONOMY—See Garage Equipment Mfg. Co.

ELECK-TRICK—See Gibney Tire & Rubber Co.

ELECTRIC Vulcanizer Co., 618 Third Ave. S., Minneapolis, Minn. "Minneapolis."

FEDERAL Auto Accessories Co., Union National Bank Bldg., Columbus, O. "S.S.S."

G-WIZ—See National Motor Supply Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Economy."
(See page 87.)

GIBNEY Tire & Rubber Co., Philadelphia, Pa. "Eleck-Trick."

GILLILAND Auto Supply Co., D. C., 3355 S. Grand Ave., St. Louis, Mo.

GILSON Motor Starting Co., 1407-09 N. Illinois St., Indianapolis, Ind.

GWINN-BACON Vulcanizer Co., 34-37 Arsenal St., St. Louis, Mo.

HILL-STAGE Co., 604 Jackson St., Anderson, Ind.

HIPWELL Mfg. Co., 831-35 North Ave., W., Pittsburg, Pa.

KENMORE Mfg. Co., 15 N. Crawford Ave., Chicago, Ill.

LAZARUS Mfg. Co., 746 Euclid Ave., Cleveland, O.

LEADER Mfg. Co., 3049 W. 25th St., Cleveland, O. "Peerless."

LITTLE WONDER—See Rice & Dayton Mfg. Co.

MABURN—See Mapes & Burns Mfg. Co.

MAPES & Burns Mfg. Co., 16 Fulton Ave., Rochester, N. Y. "Maburn."

MARVEL Auto Supply Co., 1220 W. Sixth St., Cleveland, O.

MASCO—See Milwaukee Auto Specialty Co.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco," "Radio."
(See page 445.)

MINNEAPOLIS—See Electric Vulcanizer Co.

NATIONAL Cement & Rubber Co., 300-16 S. St. Clair St., Toledo, O.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O. "Wizard," "G-Wiz."

NEW Process Vulcanizer Co., 665-67 Spring St., Toledo, O. "Vul-car."

NURINKLE—See Stevenson, R. E.

PEERLESS—See Leader Mfg. Co.

POSITIVE Tire Vulcanizer Co., 415½ Rock Island St., Davenport, Ia.

RADIO—See Milwaukee Auto Specialty Co.

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SHALER

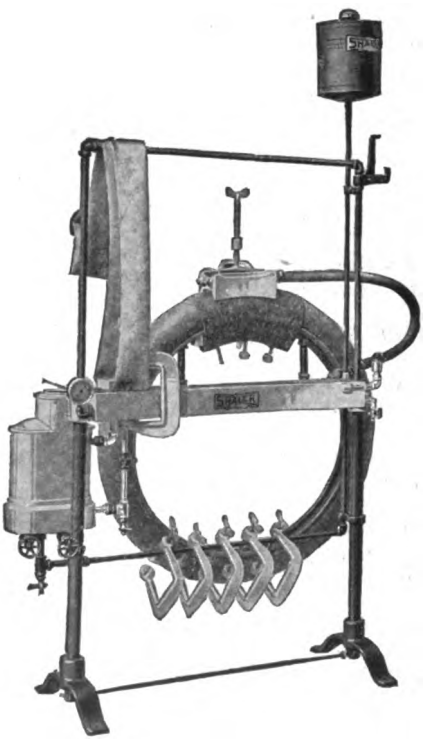
Vulcanizers

Keep Tires in Perfect Condition

The Shaler is the "Standard" vulcanizer used by the best garages and repair shops everywhere. We make the only complete line of vulcanizers—from the $3.50 Shaler Vul-Kit to complete Garage Equipment. We are the largest manufacturers of vulcanizers in the world, and our complete line includes vulcanizers of every type—Electric, Gasoline, Alcohol and Steam, for every requirement.

Dealers—Garages —Repair Shops

The Shaler is the only vulcanizer with Automatic Heat Control. More Shaler Vulcanizers are sold than of all other makes combined—and every Shaler is Guaranteed. Many dealers make $15 to $20 a day extra profit vulcanizing tires with Shaler Vulcanizers. Accessory Dealers find them quick sellers that give perfect satisfaction. Every Garage and Repair Shop needs a Shaler Garage Vulcanizer for its own use, and can increase its profits by selling portable outfits to motorists to use at home or on the road. The Vulcanizer is the only accessory never furnished with any car's equipment, and every motorist needs one. Get full information—with Special Dealer's Book —"Common Sense About Tire Repairs."



C. A. SHALER COMPANY

903 Fourth Street Waupun, Wisconsin, U. S. A.

Largest manufacturers in the world of a complete line of vulcanizers

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VULCANIZERS (Continued)

PORTABLE VULCANIZERS (Continued)

RICE & Dayton Mfg. Co., 115-19 E. Fourth St., Cedar Falls, Ia. "Little Wonder."

S.S.S.—See Federal Auto Accessories Co.

SHALER Co., C. A., 903 Fourth St., Waupun, Wis. "Vul-Kit," "Stitch-In-Time." (See page 439.)

SIMPLEX Vulcanizer Co., 2422 Manderson St., Omaha, Neb.

SIMPLICITY Supply Co., 2187 E. Second St., Cleveland, O.

STEVENSON, R. E., 518 N. Capitol Ave., Indianapolis, Ind. "Nurinkle."

STITCH-IN-TIME—See Shaler Co.

TIRE Repair Equipment Co., 740 Johnson St., Appleton, Wis. "Badger."

U. S. Auto Supply Co., 182 Grand River Ave., Detroit, Mich. "Uneeda."

UNEEDA—See U. S. Auto Supply Co.

UNIVERSAL—See Adamson Mfg. Co.

VUL-CAR—See New Process Vulcanizer Co.

VUL-KIT—See Shaler Co.

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburg), Pittsburg, Pa.

WETHERHOLT Sporting Goods Co., 155 N. High St., Columbus, O.

WHEELING Stove & Range Co., 86 19th St., Wheeling, W. Va.

WIZARD—See National Motor Supply Co.

SHOP VULCANIZERS

AKRON-WILLIAMS—See Williams Foundry & Machine Co.

ALLEN—See Diamond Mfg. Co.

AUTO Tire Vulcanizing Co., Lawrence St., Lowell, Mass.

BIGGS Boiler Works Co., Akron, O.

BURGE Machine Works 218-30 N. Jefferson St., Chicago, Ill. "Excelsior."

COMET Mfg. Co., Flandrau, S. Dak.

DIAMOND Mfg. Co., Des Moines, Ia. "Allen."

ELECTRIC Vulcanizer Co., 618 Third Ave. S., Minneapolis, Minn. "Minneapolis."

EXCELSIOR—See Burge Machine Works.

H. & H. Mfg. Co., 511 N. Ninth St., Lafayette, Ind.

HAYNER—See Mason Mfg. Co.

HAYWOOD Tire & Equipment Co., Indianapolis, Ind.

HILL-STAGE Co., 604 Jackson St., Anderson, Ind.

MARTIN & Bro., Fred., 161 Bertie St., Pomona, Cal.

MASON Mfg. Co., Mason, Mich. "Hayner."

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium." (See page 445.)

MINNEAPOLIS—See Electric Vulcanizer Co.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O.

PROGRESSIVE Mfg. Co., 468 64th Ave. (West Allis), Milwauke, Wis.

RADIUM—See Milwaukee Auto Specialty Co.

SHALER Co., C. A., 903 Fourth St., Waupun, Wis. (See page 439.)

VANDERPOOL Co., 723 W. Mulberry St., Springfield, O.

WHEELING Stove & Range Co., 86 19th St., Wheeling, W. Va.

WILLIAMS Foundry & Machine Co., Ash St., Akron, O. "Akron-Williams."

WARMERS

FOOT WARMERS

(See Heaters, Automobile)

WASHERS

CORK WASHERS

ARMSTRONG Cork Co., 23d St. & Railroad Ave., Pittsburg, Pa.

DIAMOND Cork Co., 59 Pearl St., New York, N. Y.

MUNDET & Son, L., King, Ferris & Sullivan Sts., Brooklyn, N. Y.

PADDOCK Cork Co., 1209-17 De Kalb Ave., Brooklyn, N. Y.

SPANISH-AMERICAN Cork Co., 2211 Pennsylvania Ave., Baltimore, Md.

FELT WASHERS

ADVANCE Felt Specialty & Cutting Co., 609 N. La Salle Ave., Chicago, Ill.

AMERICAN Felt Co., 103 Bedford St., Boston, Mass.

BOOTH, N. E., 644 Pacific St., Brooklyn, N. Y. (See page 441.)

BRAUNSDORF, Geo. W., 232-34 E. 43d St., New York, N. Y.

BRAWLEY, T. R., 85-87 Adams St., Brooklyn, N. Y. (See page 493.)

HOUSE & Sons, Chas. W., Unionville, Conn.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich. (See page 485.)

WESTERN Felt Works, 4115-23 Ogden Ave., Chicago, Ill.

FINISHING WASHERS

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

MASSACHUSETTS Machine Shop, 100 Beacon St., Worcester, Mass.

READ Co., A. P., 427-41 W. Randolph St., Chicago, Ill.

STANLEY Works, New Britain, Conn.

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Felt Washers

N. E. Booth Makes Felt Washers—makes them better and quicker and cheaper than you can probably get them anywhere else in these United States.

The reason? He specializes. He makes it his sole business to supply you with washers, packings, dust and oil rings and other felt goods more advantageously than anyone else can. And he succeeds.

Prove this to your own satisfaction by trying Booth on your next felt order. You'll find the "specialist" can save you both time and money and give better service.

N. E. Booth, 644 Pacific St., Brooklyn, N. Y.
CANADIAN OFFICE AND FACTORY, GANANOQUE, ONTARIO

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WASHERS (Continued)

IRON AND STEEL WASHERS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BETTCHER Mfg. Co., Cleveland, O.

BOSSERT Co., Utica, N. Y. (See page 217.)

CLARK Bros. Bolt Co., Millidale, Conn. (See page 79.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

FALLS Rivet Co., Kent, O.

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

HOEFELD & Co., R., Buffalo, N. Y.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

McKINNEY Mfg. Co., Pittsburg, N. S., Pa.

MASSACHUSETTS Machine Shop, 100 Beacon St., Worcester, Mass.

NEW England Bolt & Steel Co., Bowdoin St., (Everett), Boston, Mass.

PITTSBURG Screw & Bolt Co., Preble Ave. (N. S.), Pittsburg, Pa.

PLYMOUTH Mills, Plymouth, Mass.

QUADRIGA Mfg. Co., 119 N. Canal St., Chicago, Ill.

RELIANCE Mfg. Co., Massillon, O. (See page 465.)

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

SESSIONS & Son, J. H., Bristol, Conn.

SMITH Co., Thomas, 13 Cypress St., Worcester, Mass.

STANLEY Works, New Britain, Conn.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

UPSON Nut Co., Unionville, Conn.

WROUGHT Washer Mfg. Co., S. Bay & Reynolds Sts., Milwaukee, Wis.

LEATHER WASHERS

ALGCO—See Auburn Leather Goods Co.

AUBURN Leather Goods Co., Auburn, N. Y. "Algco."

BRACE Leather Goods Co., 22 Wayne St., Pontiac, Mich.

CHICAGO Rawhide Co., 1301 Elston Ave., Chicago, Ill.

DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich.

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

G & K—See Graton & Knight Mfg. Co.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K." (See page 67.)

HOEFELD & Co., R., Buffalo, N. Y.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. (See pages 209 and 321.)

MARSH Co., Charles W., Muskegon, Mich.

SOVEREIGN Co., C. E., 112-20 Court Pl., Rockford, Ill.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich. (See page 485.)

LOCK WASHERS

See Nuts, Lock)

STEEL SPRING WASHERS

BARNES Co., Wallace, Wallace & Parallel Sts., Bristol, Conn. (See page 397.)

HOBBS Mfg. Co., Worcester, Mass.

VEHICLE WASHERS

ADVANCE Mfg. Co., E. Atlantic Ave., Franklin, Pa.

BINKS—See Star Brass Works.

BURKE—See Superior Brass Mfg. Co.

CATARACT Auto-Vehicle Washer Co., Topeka, Kans.

CENTURY Foundry Co., 1622 N. Salina St., Syracuse, N. Y. "Wizard."

CLOOS—See Imperial Valve Co.

CROWN—See King, H. P.

DE LUXE—See F. A. M. Auto Supply Co.

EVERREADY—See Smith Mfg. Co.

F. A. M. Auto Supply Co., 698 Main St., Buffalo, N. Y. "De Luxe."

FEDERAL—See Walworth Mfg. Co.

GAYLORD Sanitary Mfg. Co., 561 Main St., E., Rochester, N. Y.

HICKS Brush Co., Howard A., 826 18th St., Denver, Colo.

IMPERIAL Valve Co., 847 Holton St., Milwaukee, Wis. "Cloos."

IRVING—See Smith Mfg. Co.

KING, H. P., 3112 Lorain Ave., Cleveland, O. "Crown," "Peerless."

KIRCHER & Wood, Peoria, Ill.

L. & M.—See Long Machine Works.

LONG Machine Works, Adam A., Ave. E & St. Paul St., Rochester, N. Y. "L. & M."

MULLER, Edward, 1304 John St., East New Durham, N. J.

PEERLESS—See King, H. P.

PEORIA Overhead Vehicle Washer Co., 115 S. Jefferson St., Peoria, Ill.

PERFECT Mfg. Co., Albany, N. Y.

PERFECTION—See Ryan & Long.

RHODES—See Vehicle Specialty Mfg. Co.

RUBBERSET Co., 56 Ferry St., Newark, N. J.

RYAN & Long, 586 Oneida St., Appleton, Wis. "Perfection."

SANITAX Brush Co., 2333 S. Wabash Ave., Chicago, Ill.

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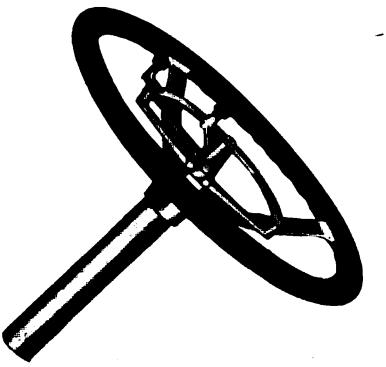
"Safety First"

Jacox

Steering Gears



Standard
Strength
and
Service

We Will Build 150,000 Steering Gears for 1915 Cars.

They Must Be Right.

Jackson-Church-Wilcox Co.
Saginaw, W. S. Michigan
U. S. A.

GET YOUR AUTO SPECIALTIES FROM

LANDERS

TOLEDO

Landers goods always satisfy, shipments are prompt—prices low. Our years of experience gives us an "inside" on things and you get the benefit. Numbered among our customers are many prominent factories. We can help you with your problems and serve you with the following items:

FLAXENE

Transparent Celluloid
Fiber Cord
Wadding
Imitation Leather

CLOTHS

BUCKRAM
WEBBING
MOHAIR,
STRAIN STRAPS,
TOP MATERIAL
COLORS TO MATCH

BURLAP

Oiled Duck Sheeting
Duck
Cushion Canvas
Bow Lining

CARPETS

ENAMELED AND RUBBER MUSLINS, DRILLS AND DUCKS

LANDERS BROTHERS COMPANY

Dept. A TOLEDO, OHIO

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WASHERS (Continued)

VEHICLE WASHERS (Continued)

SMITH Mfg. Co., I. J., 1007 Ave. Q., Brooklyn, N. Y. "Irving," "Everready."

SMITH & Co., Jos. N., Detroit, Mich. (See page 203.)

STAR Brass Works, 1909-11 Fulton St., Chicago, Ill. "Binks."

SUPERIOR Brass Mfg. Co., 106 S. Eighth St., St. Louis, Mo. "Burke."

UNIVERSAL—See Utilities Equipment Co.

UTILITIES Equipment Co., 31 State St., Boston, Mass. "Universal."

VEHICLE Specialty Mfg. Co., 26 State St., Hartford, Conn. "Rhodes."

WALWORTH Mfg. Co., Boston, Mass. "Federal."

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill.

WIZARD—See Century Foundry Co.

WASTE

COTTON WASTE

ARBELLA Waste Co., 1210 Dorchester Ave., Boston, Mass.

BISHOP Mfg. Co., Robert (S. Boston), Boston, Mass.

BLAKELEY & Son, John, 1089 Germantown Ave., Philadelphia, Pa.

BRIGGS & Co., H. A., 242-52 Pine St., Pawtucket, R. I.

EGAN Waste Co., 19 Burling Slip, New York, N. Y.

ESTES Mills, Fall River, Mass.

FIDELITY—See Hagy Waste Works.

FOWLER Waste Mfg. Co., Vineland, N. J.

FULTON Bag & Cotton Mills, Atlanta, Ga.

HAGY & Son, Clayton L., 16th & Carpenter Sts., Philadelphia, Pa.

HAGY Waste Works, J. Milton, 836-42 Swanson St., Philadelphia, Pa. "Fidelity."

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y.

LILLIE Co., Dexter P., Indian Orchard, Mass.

MASSASOIT Mfg. Co., Fall River, Mass.

OLMSTED & Tuttle Co., McKinley Ave., Chicopee, Mass.

RIVERSIDE Mills, Kollock & Bay Sts., Augusta, Ga.

ROWACO—See Royal Waste Co.

ROYAL Mfg. Co., 30 E. Grand St., Rahway, N. J.

ROYAL Waste Co., 146 Oliver St., Boston, Mass. "Rowaco."

SNOW DRIFT—See Sweetland Waste Co.

SOUTH Atlantic Waste Co., Charlotte, N. C.

SPRINGFIELD Waste Co., Mill St., Springfield, Mass.

STANDARD Waste Mfg. Co., 2306-10 N. American St., Philadelphia, Pa.

SWEETLAND Waste Co. (S. Boston), Boston, Mass. "Snow Drift."

TRAVERS Twine & Cordage Co., 81 Warren St., New York, N. Y.

UNION Wadding Co., Pawtucket, R. I.

WATCHES

LIMOUSINE WATCHES

NEW England Watch Co., Waterbury, Conn.

WEBBING

JUTE WEBBING

BUFFALO Weaving & Belting Co., 234 Chandler St., Buffalo, N. Y.

LANDERS Bros. Co., Dept. A, Toledo, O. (See page 443.)

LUDLOW Mfg. Associates, Boston, Mass.

SUSQUEHANNA Webbing Co., Bloomsburg, Pa.

WELDING

AUTOGENOUS WELDING

ADVANCE Welding & Machine Co., 111 N. Desplaines St., Chicago, Ill.

AIRD Motor Co., 2 Federal St., Troy, N. Y.

AKRON Welding Co., Sweitzer Ave. & Crosier St., Akron, O.

AMERICAN Welding Co., 2637 Michigan Ave., Chicago, Ill.

AMERICAN Welding & Auto Repair Co., 23d & Olive Sts., St. Louis, Mo.

ATLAS Oxy-Acetylene Welding & Supply Co., 2930 Penn Ave., Pittsburgh, Pa.

ATLAS Welding Works, 2424 Elizabeth Ave., Rahway, N. J.

BIRMINGHAM Welding & Machinery Co., 118 S. 22d St., Birmingham, Ala.

BOSSERT Co., Utica, N. Y. (See page 217.)

BOURNONVILLE Welding Co., Eug., 241-45 W. 64th St., New York, N. Y.

BROOKLYN Welding Co., 29 York St., Brooklyn, N. Y.

BUSCH-HARTMAN Co., 716 Golden Gate Ave., San Francisco, Cal.

CAPITOL Welding Co., 45-47 Sabin St., Providence, R. I.

CAVE Welding Co., 32 Liberty St., Springfield, Mass.

COLUMBUS Welding Shop, 294-96 N. Third St., Columbus, O.

CROSBY Co., Buffalo, N. Y. (See page 539.)

DAVIS Sewing Machine Co., Linden & Davis Sts., Dayton, O.

DELCAMPE Welding Co., 1517 Wood Ave., Bridgeport, Conn.

DES MOINES Welding Co., 117-19 Grand Ave., Des Moines, Ia.

DETROIT Welding Specialty Co., 152 Congress St., E., Detroit, Mich.

Complete Index to Classification appears on Pages 8 to 26.

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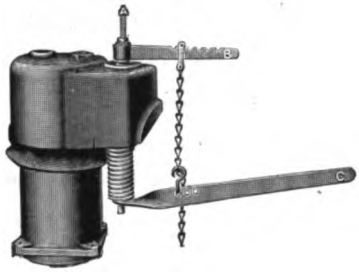
WINSOR PATENT ADJUSTABLE MOTOR VALVE REMOVER

A most perfect and positive device for removing valves from motors, adjustable to all kinds and conditions, simple in construction and application and easy to operate. No wrench needed. For removing direct valves, remove spark plug, insert barrel A, screw down spindle in order to hold valve to release fastening. To remove exhaust valves, re-



move cap using cap for direct valve. For replacing valves, place Lever B on Barrel A and attach Lever C to chain. Lever B will swing in either direction. Made in sizes to fit all Spark Plugs. Metric. ⅞-18, A. L. M. ½ Standard.

Price, Nickel Plated Each.....$3.75
Price, Enameled Black Each.....$1.50
Extra Barrels Each.....$1.20

Manufactured by

Winsor Manufacturing Company
55 Eddy Street, Providence, R. I.

Radium Steam Vulcanizer

For Kerosene or Gas

INVESTIGATE THIS VULCANIZER

Write for our Catalogue

Simple, perfectly practical and economical.

Will repair 4 tubes or 2 tubes and 2 tires at same time in 20 to 30 minutes.

Heated by kerosene—can be used anywhere.

Steam heat under absolute steady control.

Automatic control makes perfect cure throughout. Heated in 10 minutes.

Guaranteed to give satisfaction.

No. 2. List Price $35.00

Write for Discounts.

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Manufacturers
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Detroit Springs
SILENT TRADE MARK SELF-LUBRICATING

Set a Standard of Quality

Detroit Springs on a car show careful selection. Manufacturers who use Detroit Springs set a standard of quality for the car throughout. Cars equipped with Detroit Springs inspire the motorist with confidence in every part of his car.

Perfect Resiliency

Detroit Springs are neither too stiff nor too flexible. This mechanical perfection insures protection for the motor, frame, transmission and tires against wear and breakage. Our exclusive self-lubricating device, on Detroit Springs only, does away with squeaking—abolishes friction.

You Can Guarantee Detroit Springs

against settling, cracking or breakage for two years. We protect you.

Write us for catalog and more information.

Detroit Steel Products Co.
2274 E. Grand Blvd.
DETROIT, MICH.

BROKEN PARTS WELDED

Why pay good money for new parts when we can weld your cracked cylinders and crankcases and make them as strong and efficient as any new part—and charge from one-half to three-quarters less?

SEND US YOUR SCORED CYLINDERS

We make a specialty of this work using a unique and effective process to repair cylinder scored from a loose wrist pin. Bore is not enlarged—the same piston and rings will fit repaired cylinder.

Charges according to size of bore.

You Can Save Many Dollars—and Get Prompt Service

Yes, we can save you many dollars that would otherwise be spent for new parts which would be *no* stronger than repaired parts. And remember that all repairs are made within 24 hours after we receive the part—and that *we guarantee all our work for one year from date of repair.*

WATERBURY WELDING COMPANY
1147 South Street Waterbury, Conn.

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WELDING (Continued)

AUTOGENOUS WELDING (Continued)

DYER Apparatus Co., 155 Brookline St., Cambridge, Mass. (See page 511.)

ELLINGER Mfg. Co., Walter, 827 Pennsylvania Ave., Sheboygan, Wis.

GREAT Lakes Welding Co., 937-45 West St., Cleveland, O.

HAVENS Bros., Mfg. Co., 1622 Wazee St., Denver, Colo.

HUB Machine, Welding & Contracting Co., 22d & Race Sts., Philadelphia, Pa.

JACOBS Co., F. L., 451 Guoin St., Detroit, Mich.

JOHNSON Welding & Auto Repair Co., 714 S. Wabash Ave., Chicago, Ill.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

METAL Welding & Supply Co., 809-11 Broadway, Denver, Colo.

METALS Welding Co., 4400 Perkins Ave., Cleveland, O.

NATIONAL Welding & Mfg. Co., 1418-30 Niagara St., Buffalo, N. Y.

OHIO Welding & Mfg. Co., 828-30 W. Sixth St., Cincinnati, O.

OREGON Welding & Mfg. Co., 305 Glisan St., Portland, Ore.

OXY-ACETYLENE Welding Co., 1921 Grand Ave., Kansas City, Mo.

OXY-ACETYLENE Welding & Machine Co., 1818 Webster Ave., New York, N. Y.

OXY-CARBI Co., New Haven, Conn.

PITTSBURGH Reinforced Brazing & Machine Co., 2525 Liberty Ave., Pittsburg, Pa.

PITTSFIELD Welding Co., 92 Renne Ave., Pittsfield, Mass.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind. (See page 509.)

R. I. Welding & Sherardizing Co., Promenade & Park Sts., Providence, R. I.

SANFORD Mfg. Co., F. C., 1235-41 Howard Ave., Bridgeport, Conn.

SCHAAP Automobile Co., 344 Cumberland St., Brooklyn, N. Y.

SMITH & Co., W. R., 304-06 W. 52d St., New York, N. Y.

STANDARD Welding & Mfg. Co., 945 Main St., Buffalo, N. Y.

SUPERIOR Welding & Machine Co., Quintard Pl., Stamford, Conn.

TRAGESER Steam Copper Works, John, 447-57 W. 26th St., New York, N. Y.

TWIN City Welding Co., 313 Seventh Ave., S., Minneapolis, Minn.

UNION Oxy-Carbide Co., 740 Jamaica Ave., Brooklyn, N. Y.

VULCAN Brazing & Machine Co., 310-12 N. 16th St., Philadelphia, Pa. (See page 507.)

WATERBURY Welding Co., 1147 South St., Waterbury, Conn. (See page 445.)

WATERHOUSE Welding Co., 6 Pelham St., Boston, Mass.

WELDRITE Co., 350 Jackson Ave., Long Island City, N. Y.

WESTERN Drop Forge Co., Marion, Ind. (See page 525.)

WESTERN Welding & Mfg. Co., 557 W. Jackson Blvd., Chicago, Ill.

WILKES-BARRE Welding Co., 6 W. Ross St., Wilkes-Barre, Pa.

WORCESTER Pressed Steel Co., Worcester, Mass. (See page 157.)

ELECTRIC WELDING

AKRON-SELLE Co., High & Chestnut Sts., Akron, O.

BECKLEY Perforating Co., C. R. R. Ave., Garwood, N. J.

BILLINGS & Spencer Co., Hartford, Conn.

DETROIT Electric Welder Co., 255 Lafayette Ave., W., Detroit, Mich.

ELECTRIC Welding Products Co., Cleveland, O. (See page 592.)

JACOBS Co., F. L., 451 Guoin St., Detroit, Mich.

LEWIS Electric Welding & Mfg. Co., 4080 Detroit Ave., Toledo, O. (See page 501.)

McDOWELL Mfg. Co., 541 Wood St., Pittsburg, Pa. (See page 427.)

MICHIGAN Electric Welding Co., 520 Hart Ave., Detroit, Mich. (See page 593.)

OAKES Pressed Steel Co., Indianapolis, Ind.

STANDARD Welding Co., Cleveland, O. (See Book Mark.)

THOMSON Electric Welding Co., 161 Pleasant St., Lynn, Mass.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

WHEELS

CAST STEEL WHEELS

BUCHANAN Electric Steel Co., Buchanan, Mich.

DAYTON Steel Foundry Co., Dayton, O.

JOHNSON Steel Wheel Corp., 30 Kemble St., Boston, Mass.

MICHIGAN Steel Casting Co., Detroit, Mich. (See page 353.)

SHELDON Axle Co., Wilkes-Barre, Pa. (See page 283.)

WEST Steel Casting Co., 805-13 E. 70th St., Cleveland, O.

PRESSED STEEL WHEELS

BACHEM, Max, 999 Woodward Ave., Detroit, Mich. (Importer.) "Crown Prince." (See page 447.)

CROWN PRINCE—See Bachem, Max.

CUSTER Coupling Co., Bradford, Pa.

DEMOUNTABLE WHEELS

DUNLOP Wire Wheel Corp. of America, 2130 Broadway, New York, N. Y.

Complete Index to Classification appears on Pages 8 to 26.

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Automobile Wheels

For Truck and Pleasure Car

WAYNE WHEEL COMPANY
Newark, New York State

BIMEL SPOKE & AUTO WHEEL CO
Bimel
PORTLAND, IND.

The only wheels made from strictly Indiana & Ohio timber

BIMEL SPOKE & AUTO WHEEL COMPANY
PORTLAND, IND.

If you value safety, comfort, durability, more speed and less tire wear, insist upon Crown Prince Wheels.

The leading cars of Europe have adopted them in preference to both wooden and wire wheels.

They will not break or buckle, are over 200 per cent stronger than the strongest wooden wheels and fifty per cent easier on tires.

You wouldn't trust yourself in a car with a wooden axle—why take a chance on wooden wheels?

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Sole Representative for U. S. A.
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CYLINDERS **CRANK CASES**

GREY—IRON—CASTINGS

EMPLOYING THE FRENCH SYSTEM OF DRY SAND MOULDING

DETROIT **MICHIGAN**

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WHEELS (Continued)

DEMOUNTABLE WHEELS (Continued)

E. C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

F. & H. Wire Wheel Co., Columbus, O. (See page 449.)

GREAT Western Mfg. Co., Laporte, Ind. "Lindsay."

HOUK Mfg. Co., Buffalo, N. Y.

LINDSAY—See Great Western Mfg. Co.

RUDGE-WHITWORTH—See Standard Roller Bearing Co.

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa. "Rudge-Whitworth."

WHITESIDE Wheel Co., Canal & Tenth Sts., Indianapolis, Ind.

SPECIAL PNEUMATIC, SPRING AND EMERGENCY WHEELS

AMERICAN Motor Wheel Co., K. of P. Bldg., Crawfordsville, Ind., "Coats."

AUTOMOBILE Spring Wheel Co., 413 W. Broadway, New York, N. Y. "Sipe."

COATS—See American Motor Wheel Co.

DURGIN Auto Wheel Co., Lawrence National Bank Bldg., Lawrence, Kans. "Modlin."

IDEAL Steel Wheel Co., Elkhart, Ind.

INDESTRUCTIBLE Wheel Co., 809 E. Walnut St., Lebanon, Ind. "Lofland."

JENKINS Emergency Wheel Co., Mutual Bldg., Richmond, Va.

JOHNSON Steel Wheel Corp., 30 Kemble St., Boston, Mass.

KELSEY Wheel Co., Detroit, Mich.

LEAP Resilient Wheel Co., 2438 Michigan Ave., Chicago, Ill.

LEIB Yielding Wheel Co., 105 McKinley Ave., Middletown, O.

LOFLAND—See Indestructible Wheel Co.

MATHIESEN Spring Cushion Wheel Co., 2332 S. Michigan Ave., Chicago, Ill.

MODLIN—See Durgin Auto Wheel Co.

OSHKOSH—See Pneumatic Hub Wheel Co. "Oshkosh."

PECK Wheel Co., 4058 Princeton Ave., Chicago, Ill.

PNEUMATIC Hub Wheel Co., Oshkosh, Wis.

SCHICK Wheel & Tire Co., 89 Indiana Ave., Wheeling, W. Va.

SEWELL Cushion Wheel Co., Gratiot Ave. & Beaufait St., Detroit, Mich.

SIPE—See Automobile Spring Wheel Co.

TISCHER Spring Wheel Co., Saratoga, Wyo.

URIE, W. T., Independence, Mo.

STEERING WHEELS

AMERICAN Wood Rim Co., Onaway, Mich.

COLEMAN Mfg. Co., 679-85 Atwater St. E., Detroit, Mich.

PERFECTION—See Prosser Engineering Co.

PROSSER Engineering Co., 2106 W. Superior Ave., Cleveland, O. "Perfection."

TUCKER Wood Work Co., Sidney, O.

HEATED STEERING WHEELS

MOTORIST Warm Grip Co., Marshall, Tex.

WARM Hand Steering Wheel Corp., Poughkeepsie, N. Y. (See page 535.)

WIRE WHEELS

ASHLEY—See General Rim Co.

CAMERON Wire Wheel Co., Detroit, Mich.

E.-C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

GENERAL Rim Co., Swetland Bldg., Cleveland, O. "Ashley."

HOUK Mfg. Co., Buffalo, N. Y.

KELSEY Wheel Co., Detroit, Mich.

MOTT Wheel Works, Utica, N. Y. (See page 359.)

PRESTO Inter-Rim Co., 883 Boylston St., Boston, Mass. (See page 337.)

SPRANGER Rim & Wheel Co., Ford Bldg., Detroit, Mich.

STANDARD Welding Co., Cleveland, O. "Stanweld." (See Book Mark.)

STANWELD—See Standard Welding Co.

UNIVERSAL Auto Equipment Co., Detroit, Mich.

UNIVERSAL Welding Co., St. Anne, Ill.

WHITESIDE Wheel Co., Canal & Tenth Sts., Indianapolis, Ind.

WOOD WHEELS

ARCHIBALD Wheel Co., 150 West St., Lawrence, Mass.

AUBURN Wheel & Mfg. Co., Auburn, R. I.

AUTO Wheel Co., Lansing, Mich. (See page 525.)

BALTIMORE Hub-Wheel & Mfg. Co., Harford Ave. & B. & O. R. R., Baltimore, Md.

BIMEL Spoke & Auto Wheel Co., Portland, Ind. (See page 447.)

BUCKEYE Wheel Co., Galion, O.

CENTRAL City Wheel Works, Plum & Wilkinson Sts., Syracuse, N. Y.

DEFIANCE—See Turnbull Wagon Co.

EAMES & Co., A. M., South Framingham, Mass.

EBERLY & Orris Mfg. Co., Mechanicsburg, Pa.

EMPIRE Wheel Works, 174 South St., Utica, N. Y.

HARRIS Co., Union St. & Payson Ave., Easthampton, Mass.

HAYES Wheel Co., Jackson, Mich.

HOOPES Bros. & Darlington, West Chester, Pa.

JAMESTOWN Wheel & Mfg. Co., Jamestown, N. Y.

JONES & Co., Phineas, Newark, N. J. (See page 525.)

KELSEY Wheel Co., Detroit, Mich.

MEEKER Mfg. Co., Linden & Hoffman Aves., Dayton, O.

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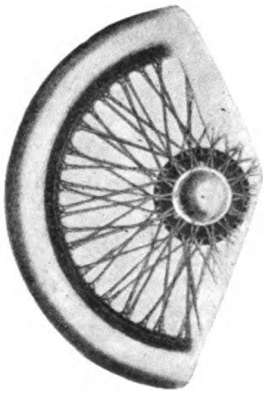


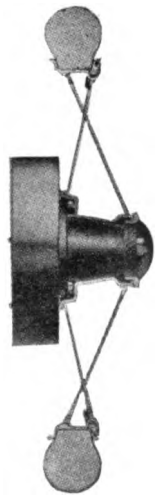
F. and H. Wire Wheels

Two spoke cross-laced

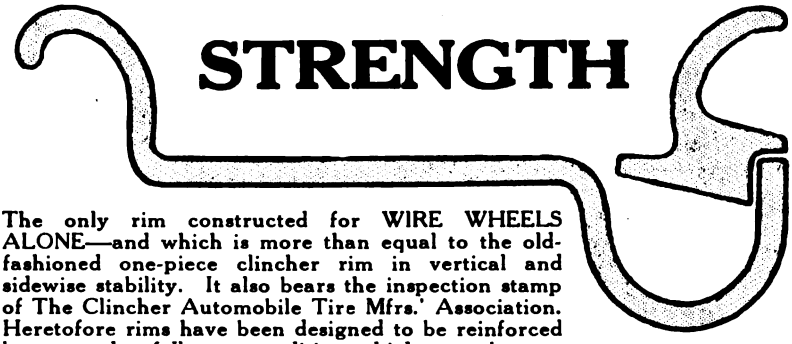
An American product in Type and Material

Built with

F. and H. Special Wire Wheel Rim



A wire wheel can be built only as strong as its rim.

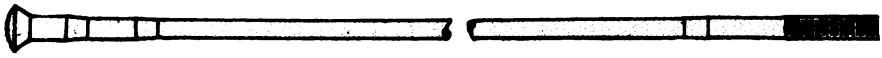


STRENGTH

The only rim constructed for WIRE WHEELS ALONE—and which is more than equal to the old-fashioned one-piece clincher rim in vertical and sidewise stability. It also bears the inspection stamp of The Clincher Automobile Tire Mfrs. Association. Heretofore rims have been designed to be reinforced by a wooden felloe, a condition which must be met in wire wheel construction. The removable side-ring is secured in such a manner that rim proper is not notched; therefore the rim is not weakened at any one point in its circumference.

The cross-laced construction with straight side Q. D. rims guarantees ample rut clearance and maintains standard tread; the shortness of the wheel's hub permits of two spare wheels being carried, while the automatic self-tightening wheel retaining nut with positive lock, insures absolute safety.

DEMOUNTABLE WHEELS INTERCHANGEABLE ALL AROUND



Next in importance to the rim is the spoke. The swedging of these spokes is of vital importance. It gives the desired resiliency and destroys through the extra diameter it leaves for head and thread any tendency to break at these points. Instead of a weak point just outside of the nipple in the thread, we have a long smaller diameter section especially prepared to absorb the shocks.

STRENGTH—RESILIENCY—LIGHT WEIGHT

The F. & H. Wire Wheel Co., Columbus, O.

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WHEELS (Continued)

WOOD WHEELS (Continued)

MILLAR Wheel Works, 3518-22 N. Clark St., Chicago, Ill.

PRUDDEN & Co., W. K., Lansing, Mich.

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 513.)

SCHWARZ Wheel Co., Margaret St. & Trenton Ave., Philadelphia, Pa.

SHORTSVILLE Wheel Co., Shortsville, N. Y.

STANDARD Wheel Co., 1701 N. 13th St., Terre Haute, Ind.

TURNBULL Wagon Co., Defiance, O. "Defiance."

WAVERLY Co., 139 S. East St., Indianapolis, Ind.

WAYNE Wheel Co., Newark, N. Y.
(See page 447.)

WHEEL & Wood Bending Co., 141 John St., Bridgeport, Conn.

WHIPCORD

UPHOLSTERY WHIPCORD

AMERICAN Mills Co., 17th St. & Fourth Ave., New York, N. Y.

ROY Woolen Co., Watervliet, N. Y.

WATERLOO Woolen Mfg. Co., Waterloo, N. Y.

WHISTLES

EXHAUST WHISTLES

(See Horns, Exhaust)

WICKING

CANDLE WICKING

BISHOP Mfg. Co., Robert (S. Boston), Boston, Mass.

ESTES Mills, Fall River, Mass.

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y.

LEES Mfg. So., 320 Broadway, New York, N. Y.

MASSASOIT Mfg. Co., Fall River, Mass.

WESTPORT Mfg. Co., Fall River, Mass.

FELT LUBRICATOR WICKING

BOOTH, N. E., 644 Pacific St., Brooklyn, N. Y.
(See page 441.)

BRAWLEY, T. R., 85-87 Adams St., Brooklyn, N. Y.
(See page 493.)

WICKS

LAMP WICKS

CONSOLIDATED Duck Co., 86 Worth St., New York, N. Y.

LEES Mfg. Co., 320 Broadway, New York, N. Y.

WIPERS

WIPERS AND POLISHING CLOTHS

(For Cotton Waste—See Waste, Cotton)

AMERICAN Mill Ends Co., Detroit, Mich.

ARBELLA Waste Co., 1210 Dorchester Ave., Boston, Mass.

CHICAGO Sanitary Rag Co., 2139-43 S. Loomis St., Chicago, Ill.

CONSUMERS Paper Co., Detroit, Mich.

DETROIT Sanitary Rag Co., 394 Harper Ave., Detroit, Mich.

DONT-MA—See Hoffman-Corr-Mfg. Co.

FULTON Bag & Cotton Mills, Atlanta, Ga.

HAGY Waste Works, J. Milton, 836-42 Swanson St., Philadelphia, Pa.

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y. "Dont-Ma."

LYMAN Co., John R., Springfield, Mass.

MILL Remnants Co., 80 West St., New York, N. Y.

NORTH & Son, Jos. W., Sixth St., Elizabeth, N. J.

NORTHWESTERN Sanitary Wiping Rag Co., 1015 Holden St., Chicago, Ill.

REACH Textile Co., A. L., 138 Pearl St., Boston, Mass.

ROWACO—See Royal Waste Co.

ROYAL Waste Co., 146 Oliver St., Boston, Mass. "Rowaco."

WIRE

BOWDEN WIRE

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.)
(See page 483.)

INSULATED WIRE

ACME Rubber Mfg. Co., Trenton, N. J.

AMERICAN Electrical Works, Phillipsdale, R. I.

AMERICAN Steel & Wire Co., 208 S. La Salle St., Chicago, Ill. "Amerite," "Americore."
(See page 451.)

AMERICORE—See American Steel & Wire Co.

AMERITE—See American Steel & Wire Co.

ATLANTIC Insulated Wire & Cable Co., 120 Liberty St., New York, N. Y.

BISHOP Gutta-Percha Co., 426 E. 25th St., New York, N. Y.
(See page 451.)

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AMERICAN STEEL & WIRE CO.

MAKERS OF

AMERITE

AND

AMERICORE

RUBBER COVERED WIRE—IGNITION WIRE—LAMP CORD

and bare copper and insulated wires
and cables for all electrical purposes.

SALES OFFICES

CHICAGO, 208 S. La Salle St.
NEW YORK, 30 Church St.
WORCESTER, 94 Grove St.
BOSTON, 120 Franklin St.
BALTIMORE, MD.
PITTSBURGH, Frick Bldg.
BUFFALO, N. Y., 337 Washington St.
WILKESBARRE, PA.
CINCINNATI, Union Trust Bldg.
CLEVELAND, Western Reserve Bldg.
DETROIT, Foot of First Street
ST. LOUIS, 3rd National Bank Building
BIRMINGHAM, ALA.
DENVER, 1st National Bank Building
ST. PAUL-MINNEAPOLIS, Pioneer Bldg., St. Paul
SALT LAKE CITY, Western Bank Bldg.

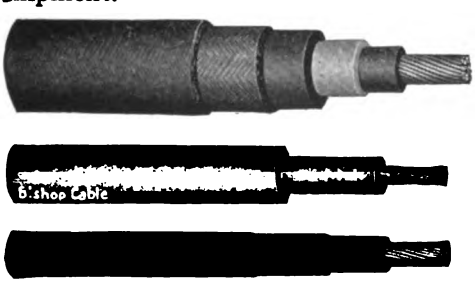
UNITED STATES STEEL PRODUCTS COMPANY

Export Department, New York, 30 Church St.
Pacific Coast Dep't, San Francisco, Rialto Bldg.
Portland, Sixth and Alder Sts.
Seattle, 4th Ave., South and Conn. St.
Los Angeles, Jackson and Central Aves.

We exhibit at the Panama-Pacific Exposition, San Francisco, 1915, in the Palace of Mines and Metallurgy

Next time you order IGNITION CABLE It will pay you to specify "BISHOP"

BISHOP IGNITION CABLE positively will outlast any other make on the market. This is due to the way it is made and the material it is made from—new Para rubber so perfectly compounded and vulcanized that it will stand *double* the voltage ever required in service—impregnated with a special compound which makes it positive proof against heat, oil, grease and water—that's why it lasts. In addition to this impregnation of the rubber itself, we coat the Braided Cable with a superior flexible enamel, thoroughly baked on. Every foot is electrically tested before shipment.



TYPE	Diameter Millimeters	Approx. Weight per 1000 Ft.	List Prices per Ft.
A	5	36 lbs.	$0.06
B	6	32 "	.07
C	7	60 "	.12
D	9	98 "	.16
E	10	110 "	.18
F	12	145 "	.25
G	12	132 "	.20
H	15	280 "	.45

Bishop Gutta-Percha Co., 426 East 25th Street NEW YORK

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WIRE (Contined)

INSULATED WIRE (Continued)

BOSTON Insulated Wire & Cable Co., Boston, Mass.
(See page 483.)

BOURN Rubber Co., 58 Warren St., Providence, R. I. "Star."

CRESCENT Insulated Wire & Cable Co., Olden Ave. & Taylor St., Trenton, N. J.

EAGLE—See Marion Insulated Wire & Rubber Co.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

GENERAL Electric Co., Schenectady, N. Y.

GOODRICH Co., B. F., Akron, O.

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y. "Red Rib."

HABIRSHAW Wire Co., 1 Madison Ave., New York, N. Y.

HAZARD Mfg. Co., 81 E. Ross St., Wilkes-Barre, Pa.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

KERITE Insulated Wire & Cable Co., 30 Church St., New York, N. Y.

MARION Insulated Wire & Rubber Co., Eighth St., & Big Four Ry., Marion, Ind. "Eagle."

NATIONAL India Rubber Co., Bristol, R. I.

NEW York Insulated Wire Co., 114 Liberty St., New York, N. Y.

OKONITE Co., 253 Broadway, New York, N. Y.

PACKARD Electric Co., Warren, O.

RED RIB—See Grossman Mfg. Co.

ROEBLINGS Sons Co., John A., Trenton, N. J.

SAFETY Insulated Wire & Cable Co., 114 Liberty St., New York, N. Y.

SIMPLEX Wire & Cable Co., 201 Devonshire St., Boston, Mass.

STANDARD Rubber & Cable Co., Bridgeport, Conn.

STANDARD Underground Cable Co., Westinghouse Bldg., Pittsburg, Pa.

STAR—See Bourn Rubber Co.

PHOSPHOR BRONZE WIRE

AMERICAN Brass Co. (Benedict & Burnham Branch), Waterbury, Conn.

OMEGA—See Riverside Metal Co.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa.
(See page 471.)

RIVERSIDE Metal Co., Riverside, N. J. "Omega."

STEEL SPRING WIRE

AMERICAN Steel & Wire Co., 208 S. La Salle St., Chicago, Ill.
(See page 451.)

HELMUTH Co., L., 17 Battery Pl., New York, N. Y. (Importers.)

MORGAN Spring Co., Worcester, Mass.

NASH Co., George, 217 Pearl St. New York, N. Y. (Importers.) "Ultra Capital."
(See page 489.)

ROEBLINGS Sons Co., John A. Trenton. N. J.

SPENCER Wire Co., Worcester, Mass.

TRENTON Iron Co., Trenton. N. J.

ULTRA CAPITAL—See Nash Co.

WOOL

STEEL WOOL

AMERICAN Steel Wool Mfg. Co., 451 Greenwich St., New York, N. Y.

BUEHNE Steel Wool Co., 93 Nassau St., New York, N. Y.

WRENCHES

VALVE PLUNGER WRENCHES

(For taking Plungers out of Tire Valves)

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

Complete Index to Classification appears on Pages 8 to 26.

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Machinery, Tools, Shop Equipment and Supplies

PART III

Classified Lists of the Manufacturers of Machinery and Tools, and of Factory, Garage, Repair Shop and Foundry Equipment and Supplies

A complete index to classifications appears on pages 8 to 26

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PENN SPRINGS

STRENGTH ELASTICITY

Penn Springs undergo tests which prove their strength and resiliency.

In these tests pressure is applied until the natural bow of the spring is almost reversed. This shows strength. Then the spring must return to its exact original shape. This shows resiliency.

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Majestic Bldg., Detroit, Mich.

Factory
Baldwinsville, N. Y.

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Part III

MACHINERY, TOOLS, SHOP EQUIPMENT AND SUPPLIES

ANVILS

BLACKSMITHS AND MACHINISTS ANVILS

BALDWIN, Tuthill & Bolton, Grand Rapids, Mich.

COLUMBIAN Hardware Co., Cleveland, O.

COLUMBUS Forge & Iron Co., Columbus, O. "Trenton."

EAGLE—See Fisher & Norris.

FISHER & Norris, Trenton, N. J. "Eagle."

HAY-BUDDEN Mfg. Co., Brooklyn, N. Y.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

PETER WRIGHT—See Wiebusch & Hilger.

TRENTON—See Columbus Forge & Iron Co.

WIEBUSCH & Hilger, New York, N. Y. (Importers.) "Peter Wright."

BALLS

BURNISHING BALLS

ABBOTT Ball Co., Hartford, Conn.

BARRELS

TUMBLING BARRELS

ABBOTT Ball Co., Hartford, Conn.

BAIRD Machine Co., Bridgeport, Conn.

BARNETT Foundry Co., Oscar, Irvington, N. J.

BYRAM & Co., Detroit, Mich.

CALUMET Foundry Equipment Co., Harvey, Ill.

GILMOUR, J., New York, N. Y.

GLOBE Machine & Stamping Co., 1250 W. 70th St., Cleveland, O. (See page 81.)

HENDERSON Bros., Waterbury, Conn.

McCORMICK Co., J. S., Pittsburg, Pa.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

PERKINS Co., Henry, Bridgewater, Mass.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

SLY Mfg. Co., W. W., Cleveland, O.

WHITING Foundry Equipment Co., Harvey, Ill.

BARS

BORING BARS

ALLEN & Curtis Co., South Bend, Ind. "Simpl."

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

CELFOR Tool Co., Buchanan, Mich.

CLOUGH, R. M., Tolland, Conn.

DAVIS Boring Tool Co., St. Louis, Mo.

KRIEGER Tool & Mfg. Co., Grand Rapids, Wis.

MARVIN & Casler Co., Canastota, N. Y.

O. K. Tool Holder Co., Shelton, Conn.

READY Tool Co., Bridgeport, Conn. "Red-E."

RED-E—See Ready Tool Co.

SIMPL—See Allen & Curtis Co.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNIVERSAL Boring Machine Co., Hudson, Mass.

BASKETS

DIPPING BASKETS

SMITH, Edward F., New Haven, Conn.

Complete Index to Classification appears on Pages 8 to 26.

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BEARINGS

OILLESS BEARINGS

ARGUTO Oilless Bearing Co., Philadelphia, Pa.

BELLOWS

HAND BELLOWS

(Blacksmiths and Molders)

BRAND Co., S. H., Chicago, Ill.

CHAMPION—See Paro. E.

CHRISTEN Bellows & Mfg. Co., St. Louis, Mo.

DOBSON, Wm., Canastota, N. Y.

HILL & Griffith Co., Cincinnati, O.

OSBORN Mfg. Co., Cleveland, O.

PARO, E., Chicago, Ill. "Champion."

WOODASON, Thos., Philadelphia, Pa.

BENDERS

ANGLE BENDERS

(Hand Power)

BERTSCH & Co., Cambridge City, Ind.

EXCELSIOR Tool & Machine Co., East St. Louis, Ill. "X L C R."

HINMAN & Co., D. A., Sandwich, Ill.

WALLACE Supply Co., Chicago, Ill.

X L C R—See Excelsior Tool & Machine Co.

BITS

AUGER BITS

BROWN & Co., R. H,. New Haven, Conn. "Clark's."

CHESTER Mfg. Co., Chester, Conn.

CLARK'S—See Brown & Co.

CONNECTICUT Valley Mfg. Co., Centerbrook, Conn.

DEUSE, J. S., Chester, Conn.

FOREST City Bit & Tool Co., Rockford, Ill.

FORSTNER—See Progressive Mfg. Co.

GREENLEE Bros. & Co., Rockford, Ill.

HUMPHREYSVILLE Mfg. Co., Seymour, Conn.

IRWIN Auger Bit Co., Wilmington, O.

IVES Mfg. Co., W. A., Wallingford, Conn. "Mephisto."

JENNINGS & Co., C. E., New York, N. Y.

KILBORN & Bishop Co., New Haven, Conn. "Lavigne."

LAVIGNE—See Kilborn & Bishop Co.

MEPHISTO—See Ives Mfg. Co.

OHIO Tool Co., Charleston, W. Va.

PROGRESSIVE Mfg. Co., Torrington, Conn. "Forstner."

RUSSELL-JENNINGS Mfg. Co., Chester, Conn.

SNELL Mfg. Co., Fiskdale, Mass.

SWAN Co., Jas., Seymour, Conn.

BLACKBOARDS

COMPOSITION BLACKBOARDS

HAMMETT Co., J. L., Brooklyn, N. Y. (See page 459.)

BLADES

HACK SAW BLADES

(For Hack Saw Frames—See Frames, Hack Saw)

A. A. A.—See Atkins & Co.

ARROW HEAD—See Jennings & Co.

ATKINS & Co., E. C., Indianapolis, Ind. "A. A. A."

BOSTON Saw & Tool Co., Boston, Mass. "Knoxall," "Champion."

CHAMPION—See Boston Saw & Tool Co.

CHROMOL—See Disston & Sons.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DISSTON & Sons, Henry, Philadelphia, Pa. "Chromol."

EUREKA-YANKEE—See Thompson & Son Co.

GOODELL-PRATT Co., Greenfield, Mass.

GRIFFIN Co., G. W., Franklin, N. H.

IRVINGTON Mfg. Co., Irvington, N. J.

JENNINGS & Co., C. E., New York, N. Y. "Arrow Head."

KNOXALL—See Boston Saw & Tool Co.

MASSACHUSETTS Saw Works, Springfield, Mass. "Victor."

MILFORD—See Thompson & Son Co.

MILLERS Falls Co., New York, N. Y. "Star."

OLDHAM & Sons, Joshua, New York, N. Y.

QUALITY Saw & Tool Works, Springfield, Mass.

RACINE Tool & Machine Co., Racine, Wis.

SIMONDS Mfg. Co., Fitchburg, Mass.

SIMPLEX Tool & Supply Co., Boston, Mass.

STAPF & Co., John B., Dunkirk, N. Y.

STAR—See Millers Falls Co.

STERLING—See Diamond Saw & Stamping Works.

TT.—See Thompson & Son Co.

THOMPSON & Son Co., Henry G., New Haven, Conn. "Milford," "Eureka-Yankee," "XL," "TT."

UNIVERSAL—See West Haven Mfg. Co.

UTILITY—See West Haven Mfg. Co.

VICTOR—See Massachusetts Saw Works.

XL—See Thompson & Son Co.

WEST Haven Mfg. Co., New Haven, Conn. "Universal," "Utility."

BLOCKS

CHAIN BLOCKS

(See Cranes, Portable)

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A High Production Chucking Machine Representing the Most Advanced Design in Every Detail

Rapid power traverse to both side-head and vertical head.

Side-head entirely independent of cross rail.

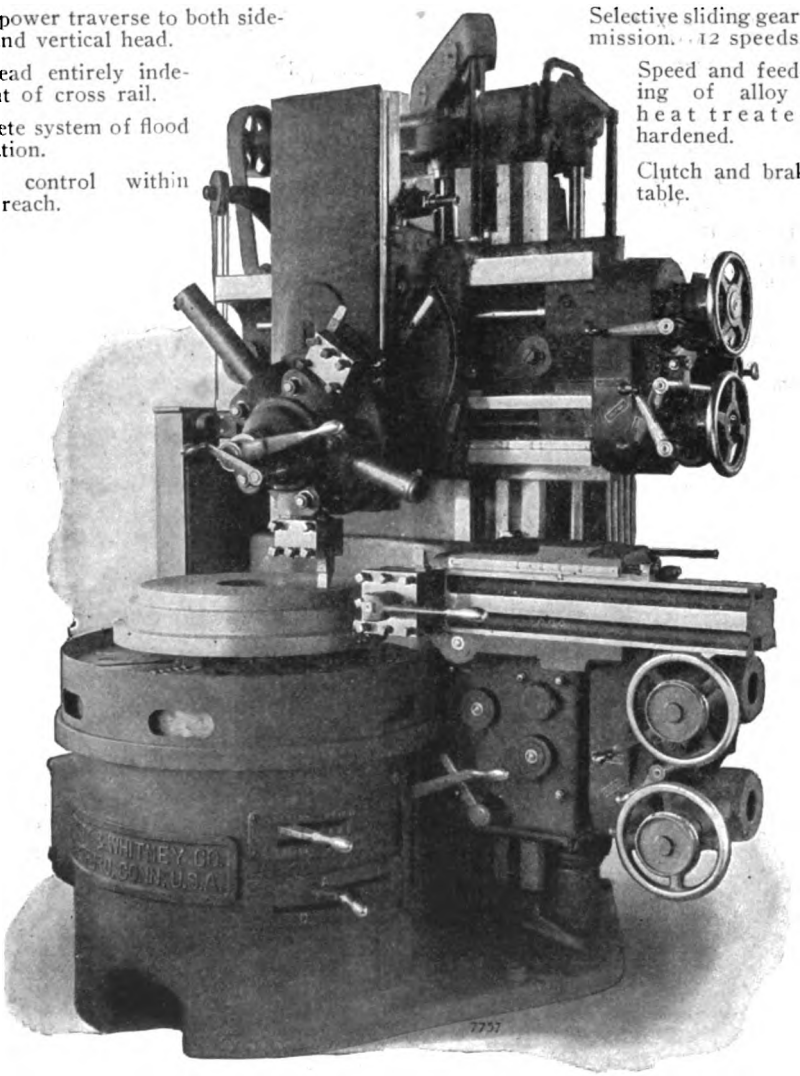
Complete system of flood lubrication.

Entire control within arm's reach.

Selective sliding gear transmission. 12 speeds.

Speed and feed gearing of alloy steel, heat treated and hardened.

Clutch and brake for table.



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NEW YORK BOSTON PHILADELPHIA PITTSBURGH CLEVELAND
CINCINNATI DETROIT CHICAGO ST. LOUIS

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BLOWERS

PRESSURE BLOWERS

ABC—See American Blower Co.

AMERICAN Blower Co., Detroit, Mich. "ABC."

AMERICAN Gas Furnace Co., 24 John St., New York, N. Y.
(See page 491.)

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Royal," "Western Chief."

CHAMPION Blower & Forge Co., Lancaster, Pa.

CONNERSVILLE Blower Co., Connersville, Ind.

HOYSRADT & Case, Kingston, N. Y.

NATIONAL Blower Works, Milwaukee, Wis.

NEW York Blower Co., Chicago, Ill.

PIQUA Blower Co., Piqua, O.

ROOTS Co., P. H. & F. M., Connersville, Ind.

ROYAL—See Canedy-Otto Mfg. Co.

U. S. Gas Machine Co., Muskegon, Mich.

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

WILBRAHAM-GREEN Blower Co., Pottstown, Pa.

BOBS

PLUMB BOBS

ACME—See Millers Falls Co.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

PECK, Stow & Wilcox Co., Southington, Conn.

READING Hardware Co., Reading, Pa.

STANLEY Rule & Level Co., New Britain, Conn.

STARRETT Co., L. S., Athol, Mass.

BOXES

ANNEALING AND CASE HARDENING BOXES

HESS Steel Castings Co., Bridgeton, N. J.

KNOX Pressed & Welded Steel Co., Pittsburg, Pa.

LEETONIA Boiler Co., Leetonia, O.

McNEIL & Bro. Co., Jas., Pittsburg, Pa.

NATIONAL Mfg. Co., Pittsburg, Pa.

OHIO Mfg. Co., Painesville, O.

WHITING Foundry Equipment Co., Harvey, Ill.

HOSE BOXES

HALE Electric & Engineering Co., Cleveland, O.
(See page 459.)

MITRE BOXES

ACME—See Millers Falls Co.

AYER—See Marsh Co.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J. "Dorn's."

DORN'S—See Braunsdorf-Mueller Co.

GOODELL Mfg. Co., Greenfield, Mass. "Greenfield."

GREENFIELD—See Goodell Mfg. Co.

LANGDON—See Marsh Co.

LANGDON—See Millers Falls Co.

MARSH Co., H. C., Rockford, Ill. "Langdon," "Ayer."

MILLERS Falls Co., New York, N. Y. "Langdon," "Acme."

OLMSTED'S Son, L. H., Hasbrouck Heights, N. J.

ROCKFORD Mitre Box Co., Rockford, Ill.

STANLEY Rule & Level Co., New Britain, Conn.

SHEET METAL TOTE BOXES

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O.

HETTS Co., Detroit, Mich.

HART & Hutchinson Co., New Britain, Conn.

KILBOURNE & Jacobs Mfg. Co., Columbus, O.

LEETONIA Boiler Co., Leetonia, O.

LYON Metallic Mfg. Co., Aurora, Ill.

MERRITT & Co., Camden, N. J.

OHIO Mfg. Co., Painesville, O.

BRACES

BIT BRACES

AMERICAN—See Turner & Deegan.

BARBER—See Millers Falls Co.

BARBERS—See Turner & Deegan.

FRAY Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

HOLDALL—See Millers Falls Co.

LANCASTER Machine & Knife Works, Lancaster, N. Y.

MAYHEW Co., H. H., Shelburne Falls, Mass.

MILLERS Falls Co., New York, N. Y. "Barber," "Holdall."

PECK, Stow & Wilcox Co., Southington, Conn.

STANLEY Rule & Level Co., New Britain, Conn.

TURNER & Deegan, Bristol, Conn. "American," "Barbers."

BRASS

BRAZING BRASS

AMERICAN Brass Co. (Waterbury Brass Branch), Waterbury, Conn.

Complete Index to Classification appears on Pages 8 to 26.

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Special sizes made to order.

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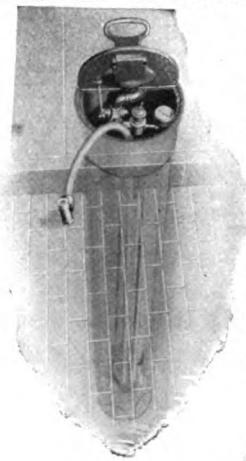

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SIMPLE AUTOMATIC EFFICIENT

Lifting the lid of the hose box automatically opens an air valve allowing the compressed air to enter the hose. A special automatic V-end valve retains the air under pressure in the hose until ready for use. 18 feet of hose may be drawn out, which returns to the box automatically when released.

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Feeds when car is in motion only.

Use on **Spring Bolts Steering Gear, etc.**

When connected horizontally use our elbow connection.

Use them and be **free from squeaks** and save **"wear and tear."**

Send sample order and be convinced.

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BRASS (Continued)

BRAZING BRASS (Continued)

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 319.)

CRESCENT—See North American Smelting Co.

LISSBERGER & Son, Marks, Long Island City, N. Y.

NORTH American Smelting Co., Philadelphia, Pa. "Crescent."

BROOMS

STEEL WIRE BROOMS

(For cleaning garage floors)

AMERICAN Wire Brush Co., New York, N. Y. "Minerva."

MINERVA—See American Wire Brush Co.

OSBORN Mfg. Co., Cleveland, O.

BRUSHES

FOUNDRY AND SHOP BRUSHES

CAPITOL—See Indianapolis Brush & Broom Co.

FLINT, Warren F., Boston, Mass.

INDIANAPOLIS Brush & Broom Co., Indianapolis, Ind. "Capitol."

MASON Brush Works, Worcester, Mass.

OSBORN Mfg. Co., Cleveland, O.

PAINT AND VARNISH BRUSHES

AERON—See De Vilbiss Mfg. Co.

BOARS HEAD—See Fisher-Mitchell Co.

BRADLEY & Smith, New York, N. Y.

BURTON & Co., A. E., Boston, Mass.

CLINTON & Co., E., Philadelphia, Pa.

DE VILBISS Mfg. Co., Toledo, O. "Aeron."

DEVOE & C. T. Raynolds Co., F. W., New York, N. Y.

ECLIPSE Air Brush & Compressor Co., Newark, N. J.

FISHER-MITCHELL Co., New York, N. Y. "Boars Head."

FRENCH & Co., Samuel H., Philadelphia, Pa.

GERTS, Lumbard & Co., Chicago, Ill.

HANLON & Goodman Co., New York, N. Y.

LEDERER Co., F. J., Buffalo, N. Y. "Presto."

LUCAS & Co., John, Philadelphia, Pa.

MILES Bros. & Co., New York, N. Y.

MURPHY, Leavens & Co., Boston, Mass.

NIAGARA Devices, Buffalo, N. Y.

OSBORN Mfg. Co., Cleveland, O.

PACKARD Co., A., Boston, Mass.

PRESTO—See Lederer Co.

RODRIGUEZ, R. E., New York, N. Y.

RUBBERSET Co., Newark, N. J.

THAYER & Co., P. E. Pawtucket, R. I.

THUM, Chas. D., Philadelphia, Pa.

UNITED Brush Manufactories, New York, N. Y.

WHITING-J. J. ADAMS Co., John L., Boston, Mass.

VARNISH BRUSHES

(See Brushes, Paint and Varnish)

BUFFERS

ELECTRIC PORTABLE BUFFERS

(See Drills, Electric Portable)

BULLDOZERS

AJAX Mfg. Co., Cleveland, O.

LONG & Allstatter Co., Hamilton, O.

NILES-BEMENT-POND Co., New York, N. Y.

ROCK River Machine Co., Janesville, Wis.

WILLIAMS, White & Co., Moline, Ill.

CALIPERS

CALIPERS AND DIVIDERS

(For Micrometer Calipers—See Micrometers)

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I

COLUMBIA—See Smith, E. G.

COPELANDS—See Eagan, Thos. F.

EAGAN, Thos. F., Worcester, Mass. "Copelands."

FAY—See Starrett Co.

GOODELL-PRATT Co., Greenfield, Mass.

JOHNSON, Wm., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

PECK, Stow & Wilcox Co., Southington, Conn.

SMITH, E. G., Columbia, Pa. "Columbia."

STARRETT Co., L. S., Athol, Mass. "Fay." "Yankee."

UNION Caliper Co., Orange, Mass.

YANKEE—See Starrett Co.

CANS

GASOLINE CANS

(For Garage use)

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ATLANTIC Stamping Co., Rochester, N. Y.

BEMAN Automatic Oil Can Co., Meadville, Pa.

CENTRAL Stamping Co., New York, N. Y.

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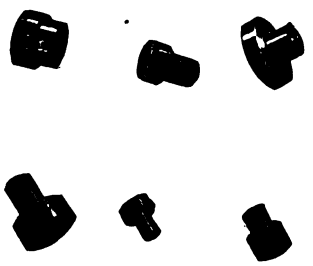

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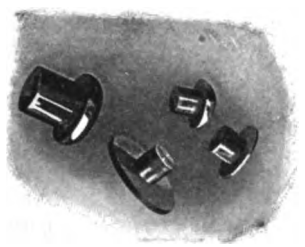

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WIRE furnished in all sizes, cut to special length, etc.
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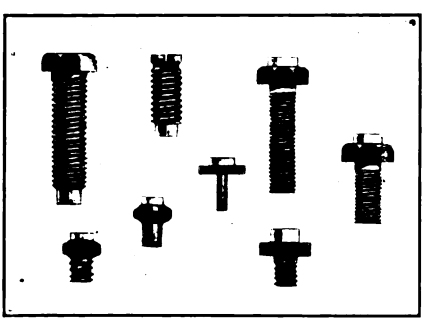

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Manager

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CANS (Continued)

GASOLINE CANS (Continued)

DELPHOS Mfg. Co., Delphos, O.

DOVER Stamping & Mfg. Co., Cambridge, Mass.
(See page 97.)

JUSTRITE Mfg. Co., Chicago, Ill.

NATIONAL Enameling & Stamping Co., New York, N. Y.

ROCHESTER Can Co., Rochester, N. Y.

SEXTON Can Co., Boston, Mass.

VOGEL & Bros., Wm., Brooklyn, N. Y.

WALLMAN Mfg. Co., Milwaukee, Wis.

WASTE CANS

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AUTO Metal Co., Springfield, Mass.

CENTRAL Stamping Co., New York, N. Y.

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O.

DELPHOS Mfg. Co., Delphos, O.

DIAMOND State Fibre Co., Elsmere, Del.
(See page 165.)

DOVER Stamping & Mfg. Co., Cambridge, Mass.
(See page 97.)

DURLACH, I., New York, N. Y.

GEM Stamped Steel Co., Boston, Mass.

JUSTRITE Mfg. Co., Chicago, Ill.

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 399.)

LITTLEFORD Bros., Cincinnati, O.

McCLINTOCK & Irvine, Pittsburg, Pa.

NACEFAS—See Wilson & Co.

ROCHESTER Can Co., Rochester, N. Y.

WALL Mfg. Supply Co., P., Pittsburg, Pa.

WILSON & Co., F. Cortez, Chicago, Ill. "Nacefas."

CASES

BOLT AND SCREW CASES

AMERICAN Bolt & Screw Case Co., Dayton, O.

CHAPLETS

FOUNDRY CHAPLETS

BURDICK & Son, Albany, N. Y.

CHAMPION Machine & Forging Co., 3725 E. 78th St., Cleveland, O.
(See page 137.)

CLEVELAND Chaplet & Mfg. Co., Cleveland, O.

CRESCENT Brass & Pin Co., Detroit, Mich.

GEM Mfg. Co., Pittsburg, Pa.

HASKINS—See Hill & Griffith Co.

HILL & Griffith Co., Cincinnati, O. "Peerless," "Haskins."

LINDSAY & Co., W. W., Philadelphia, Pa.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PEERLESS—See Hill & Griffith Co.

PHILADELPHIA Chaplet & Mfg. Co., Philadelphia, Pa.

SHANAFELT Mfg. Co., Canton, O.

UNITED States Chaplet & Supply Co., New York, N. Y.

CHISELS

CAPE CHISELS

(See Chisels, Cold and Cape)

COLD AND CAPE CHISELS

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BREWER Bros. Co., Philadelphia, Pa.

BUCK Bros., Milbury, Mass.

BUFFUM Tool Co., Louisiana, Mo.

CARVER Tool Works, Spring Valley, N. Y.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

CRONK & Carrier Mfg. Co., Elmira, N. Y.

DIAMOND—See Whitman & Barnes Mfg. Co.

DREW & Co., C., Kingston, Mass.

ELMORE Tool Mfg. Co., Hartford, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

HARGRAVE—See Cincinnati Tool Co.

HUBBARD & Co., Pittsburg, Pa.

JOHNSON, Wm., Newark, N. J.

K. & B.—See Kilborn & Bishop Co.

KILBORN & Bishop Co., New Haven, Conn. "Silex," "K. & B."

KLEIN-LOGAN Co., Pittsburg, Pa.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J

MARCY Tool Works, Putnam, Conn.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo.
(See page 539.)

NOONAN Tool & Machine Co., A. S., Rome N. Y.

OHIO Tool Co., Charleston, W. Va.

PECK, Stow & Wilcox Co., Southington, Conn

RED HEAD—See S. & I. Co.

S. & I. Co., Springfield, Mass. "Red Head."

SCHUTTE & Co., E. G., Cincinnati, O.

SHARPENEZY—See Smith & Co.

SILEX—See Kilborn & Bishop Co.

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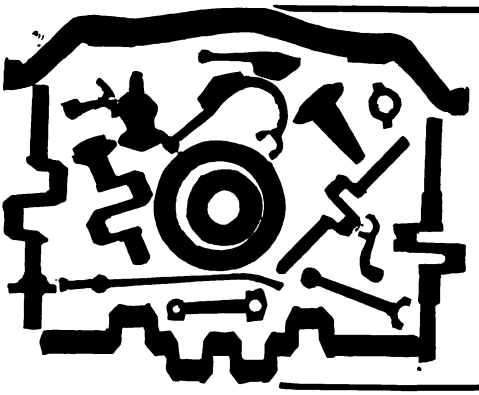

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CHISELS (Continued)

COLD AND CAPE CHISELS (Continued)

SMITH & Co., H. D., Plantsville, Conn. "Sharpenezy."

SNELL Mfg. Co., Fiskdale, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

VAN DOREN Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VERONA Tool Works, Pittsburg, Pa.

VLCHEK Tool Co., Cleveland, O.

WARNER Hammer Co., Cromwell, Conn.

WHITE Co., L. & I. J., Buffalo, N. Y.

WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

WOODWORKERS CHISELS AND GOUGES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUCK Bros., Milbury, Mass.

GREENLEE Bros. & Co., Rockford, Ill.

JENNINGS & Co., C. E., New York, N. Y.

MACK & Co., Rochester, N. Y.

OHIO Tool Co., Charleston, W. Va.

PECK, Stow & Wilcox Co., Southington, Conn.

RED HEAD—See S. & I. Co.

S. & I. Co., Springfield, Mass. "Red Head."

SWAN Co., Jas., Seymour, Conn.

WHITE Co., L. & I. J., Buffalo, N. Y.

WINSTED Edge Tool Works, Winsted, Conn.

CHUCKS

BORING MILL CHUCKS

GISHOLT Machine Co., Madison, Wis.

HORTON & Son Co., E., Windsor Locks, Conn.

UNION Mfg. Co., New Britain, Conn.

WESTCOTT Chuck Co., Oneida, N. Y.

DRILL CHUCKS

ADJUSTABLE Collet Co., Cleveland, O.

ALMOND Mfg. Co., T. R., 1 Maple Ave., Ashburnham, Mass.
(See page 427.)

AMERICAN Specialty Co., Chicago, Ill.

AUTOMATIC Drill Chuck Corp., Detroit, Mich. "Quictite."

BROWN & Co., R. H., New Haven, Conn. "Reid."

BUTLER Chuck Co., Greenfield, Mass.

CELFOR Tool Co., Buchanan, Mich.

CUSHMAN Chuck Co., Hartford, Conn.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. "Graham."
(See page 481.)

GOODELL Mfg. Co., Greenfield, Mass. "Greenfield."

GOODELL-PRATT Co., Greenfield, Mass.

GRAHAM—See Detroit Twist Drill Co.

GREENFIELD—See Goodell Mfg. Co.

GRONKVIST Drill Chuck Co., Jersey City, N. J. "Kupke."

HORTON & Son Co., E., Windsor Locks, Conn. "Morrow."

JACOBS Mfg. Co., Hartford, Conn.

KUPKE—See Gronkvist Drill Chuck Co.

LITTLE GIANT—See Westcott Chuck Co.

McCROSKY Reamer Co., Meadville, Pa. "Wizard."

MAGIC—See Modern Tool Co.

MILLER'S Falls Co., New York, N. Y.

MODERN Tool Co., Erie, Pa. "Magic."

MORROW—See Horton & Son Co.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL—See Oneida National Chuck Co.

NEW BRITAIN—See Union Mfg. Co.

ONEIDA—See Westcott Chuck Co.

ONEIDA National Chuck Co., Oneida, N. Y. "National."

PRATT Chuck Co., Frankfort, N. Y.

PRESTO—See Whitney Mfg. Co.

QUICTITE—See Automatic Drill Chuck Corp.

REID—See Brown & Co.

SKINNER Chuck Co., New Britain, Conn.

STANDARD Tool Co., Cleveland, O.

UNION Mfg. Co., New Britain, Conn. "New Britain."

WAHLSTROM Tool Co., Brooklyn, N. Y.

WEAVER Mfg. Co., Springfield, Ill.

WESTCOTT Chuck Co., Oneida, N. Y. "Little Giant," "Oneida."

WHITNEY Mfg. Co., Hartford, Conn. "Presto."
(See page 115.)

WHITON Machine Co., D. E., New London, Conn.

WIARD, F., Detroit, Mich.

WIZARD—See McCrosky Reamer Co.

LATHE CHUCKS

AMERICAN Tool & Machine Co., Boston, Mass.
(See page 515.)

CUSHMAN Chuck Co., Hartford, Conn.

HOGGSON & Pettis Mfg. Co., New Haven, Conn. "Sweetland."

HORTON & Son Co., E., Windsor Locks, Conn.

ONEIDA National Chuck Co., Oneida, N. Y.

SKINNER Chuck Co., New Britain, Conn.

SWEETLAND—See Hoggson & Pettis Mfg. Co.

UNION Mfg. Co., New Britain, Conn.

WESTCOTT Chuck Co., Oneida, N. Y.

WHITON Machine Co., D. E., New London, Conn.

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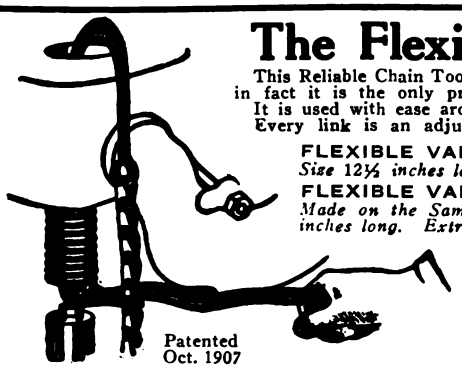

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CHUCKS (Continued)

MAGNETIC CHUCKS

D. & W. Fuse Co., Providence, R. I.
HEALD Machine Co., Worcester, Mass.
WALKER & Co., O. S., Worcester, Mass.

MILLING MACHINE CHUCKS

HORTON & Son Co., E., Windsor Locks, Conn.
ONEIDA National Chuck Co., Oneida, N. Y.
SKINNER Chuck Co., New Britain, Conn.
WESTCOTT Chuck Co., Oneida, N. Y.

PLANER CHUCKS

BARTLETT, Edwin E., Boston, Mass.
HORTON & Son Co., E., Windsor Locks, Conn.
JORDAN—See Oneida National Chuck Co.
ONEIDA National Chuck Co., Oneida, N. Y. "Jordan."
SKINNER Chuck Co., New Britain, Conn.
UNION Mfg. Co., New Britain, Conn.

PNEUMATIC CHUCKS

AEROCHUCK—See Manufacturers Equipment Co.
MANUFACTURERS Equipment Co., Chicago, Ill. "Aerochuck."

SCREW MACHINE CHUCKS

HORTON & Son Co., E., Windsor Locks, Conn.
ONEIDA National Chuck Co., Oneida, N. Y.

CLAMPS

MACHINISTS CLAMPS

ATHOL Machine Co., Athol, Mass.
BILLINGS & Spencer Co., Hartford, Conn.
BROWN & Sharpe Mfg. Co., Providence, R. I.
CINCINNATI Tool Co., Norwood, O. "Hargrave."
GOODELL-PRATT Co., Greenfield, Mass.
HARGRAVE—See Cincinnati Tool Co.
HOWELL & Murray, Waverly, N. Y.
LE COUNT, Wm. G., S. Norwalk, Conn.
MARK Mfg. Co., Chicago, Ill.
MASSEY Vise Co., Chicago, Ill.
PAWTUCKET Mfg. Co., Pawtucket, R. I.
PHOENIX Hardware Co., Buffalo, N. Y.
STARRETT Co., L. S., Athol, Mass.
TAYLOR Mfg. Co., James L., Poughkeepsie, N. Y.
WILLIAMS & Co., J. H., Brooklyn, N. Y.

WOODWORKERS CLAMPS

ADVANCE Mfg. Co., Racine, Wis. "Rej-Klamp.
(See page 467.)
ALDRICH Co., Wm. K., Lowell, Mass.
BATAVIA Clamp Co., Batavia, N. Y. "Colts."
BAY STATE—See Cutter, Geo. A.
BLISS Mfg. Co., R., Pawtucket, R. I.
BUFFALO—See Josef Mfg. Co.
CINCINNATI Tool Co., Norwood, O. "Hargrave."
COLTS—See Batavia Clamp Co.
CUTTER, Geo. A., Taunton, Mass. "Bay State."
(See page 551.)
DANN Bros. & Co., New Haven, Conn.
DAYTON Malleable Iron Co., Dayton, O.
DETROIT Screw Works, Detroit, Mich. "Reno."
(See page 341.)
EAGLE—See Woodruff & Sons Co.
EBERHARD Mfg. Co., Cleveland, O.
ERIE Stamping & Mfg. Co., Erie, Pa. "Thompson."
GRAND Rapids Hand Screw Co., Grand Rapids, Mich.
HAMMER & Co., Branford, Conn.
HARGRAVE—See Cincinnati Tool Co.
JOSEF Mfg. Co., Chicago, Ill.
MARK Mfg. Co., Chicago, Ill.
MASSEY Vise Co., Chicago, Ill.
MOUNT CARMEL—See Woodruff & Sons Co.
NATIONAL Novelty Corp., New York, N. Y.
OHIO Tool Co., Charleston, W. Va.
OLIVER Machinery Co., Grand Rapids, Mich.
PALMER & Sons, Albert E., Owosso, Mich.
PECK, Stow & Wilcox Co., Southington, Conn.
PHOENIX Hardware Co., Buffalo, N. Y.
REJ-KLAMP—See Advance Mfg. Co.
RENO—See Detroit Screw Works.
SANDUSKY Tool Co., Sandusky, O.
TAYLOR Mfg. Co., James L., Poughkeepsie, N. Y.
THOMPSON—See Erie Stamping & Mfg. Co.
WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn. "Eagle," "Mount Carmel."

CLEANERS

AUTOMOBILE ENGINE CLEANERS

BARNARD Specialty Co., Los Angeles, Cal.
BINKS—See Star Brass Works.
BISHOP-BABCOCK-BECKER Co., Cleveland, O.
CLEVELAND Faucet Co., Cleveland, O.
CODMAN & Shurtleff, Boston, Mass.
DUNKLEY Co., Kalamazoo, Mich.
LENNOX Chemical Co., Cleveland, O.
PROSPECT Mfg. Co., Prospect, O.
RAPID Auto Cleaner Co., Newark, N. J.

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They are better in appearance, in durability, in strength, in price.

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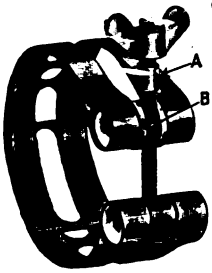

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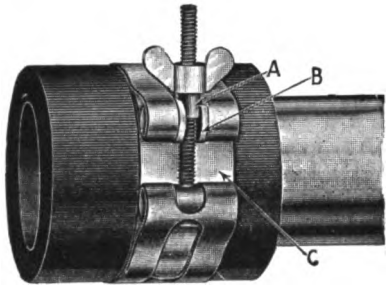

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CLEANERS (Continued)

AUTOMOBILE ENGINE CLEANERS (Continued)

ROHRBACHER Automatic Air Pump Co., Portland, Ore.

ROMORT Valve Co., Seattle, Wash.

STAR Brass Works, Chicago, Ill. "Binks."

STEVENS Mfg. & Supply Co., Chicago, Ill.

TURNER Brass Works, Sycamore, Ill.

WAGNER Specialty Co., New York, N. Y.

MINERAL CLEANERS

BENNETT-O'CONNELL Co., Chicago, Ill.

ELECTRIC Smelting & Aluminum Co., Lockport, N. Y. (See page 503.)

HACHMEISTER-LIND Chemical Co., Pittsburg, Pa.

CLIPPERS

BOLT AND RIVET CLIPPERS

(Hand Power)

ALLEN-RANDALL—See Porter, H. K.

CAROLUS—See Twin City Specialty Co.

CHAMBERS Bros. Co., Philadelphia, Pa.

COLUMBUS Bolt Works, Columbus, O.

EASY—See Porter, H. K.

ELM CITY—See Schollhorn Co.

HELWIG Mfg. Co., St. Paul, Minn.

METAL Stamping Co., Long Island City, N. Y.

NEW EASY—See Porter, H. K.

PECK, Stow & Wilcox Co., Southington, Conn.

PORTER, H. K., Everett, Mass. "Easy," "New Easy," "Allen-Randall." (See page 469.)

ROBERTS Mfg. Co., Somerville, Mass. "Victor."

SCHOLLHORN Co., Wm., New Haven, Conn. "Elm City."

TWIN City Specialty Co., Sterling, Ill. "Carolus."

VICTOR—See Roberts Mfg. Co.

RIVET CLIPPERS

(See Clippers, Bolt and Rivet)

COLLECTORS

DUST EXHAUST AND COLLECTOR SYSTEMS

ABC—See American Blower Co.

AMERICAN Blower Co., Detroit, Mich. "ABC."

BUFFALO Forge Co., Buffalo, N. Y.

KNICKERBOCKER Co., Jackson, Mich. "Morse-Rarefied."

MORSE-RAREFIED—See Knickerbocker Co.

PANGBORN Corp., Hagerstown, Md.

COMPOUNDS

BRAZING COMPOUNDS

A. & J. Mfg. Co., Chicago, Ill. "Braziron."

ACME—See Universal Fluxine Co.

BANNER—See Cortland Specialty Co.

BRAZIRON—See A. & J. Mfg. Co.

CAST Iron Brazing & Mfg. Co., Manchester, N. H.

CORTLAND Specialty Co., Cortland, N. Y. "Banner."

DIXON Crucible Co., Joseph, Jersey City, N. J. (See page 191.)

FLUXINE—See Krembs & Co.

FRY, Keyser, Reading, Pa.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

KREMBS & Co., Chicago, Ill. "Fluxine."

LAFFITTE—See Phillips-Laffitte Co.

NATIONAL Cement & Rubber Co., Toledo, O.

PHILLIPS-LAFFITTE Co., Philadelphia, Pa. "Laffitte," "Unifonte."

SCHNEIDER, Emil, Newark, N. J.

STANDARD Brazing Co., Boston, Mass "Tichon."

STANDARD Mfg. Co., Chicago, Ill. "Superior."

SUPERIOR—See Standard Mfg. Co.

TICHON—See Standard Brazing Co.

UNIFONTE—See Phillips-Laffitte Co.

UNIVERSAL Fluxine Co., Urbana, O. "Acme."

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

WONDER WORKER—See Hall-Thompson Co

BUFFING AND POLISHING COMPOUNDS

BENNETT-O'CONNELL Co., Chicago, Ill. "Mascot," "Excel-All."

DETROIT Foundry Supply Co., Detroit, Mich.

DIXON, Wm., New York, N. Y.

EXCEL-ALL—See Bennett-O'Connell Co.

LYMAN Co., John R., Springfield, Mass.

MASCOT—See Bennett-O'Connell Co.

MATCHLESS Metal Polish Co., New York, N. Y., "White-Diamond."

STEVENS, Frederic B., Detroit, Mich. "White Rose," "White Columbia." (See pages 523 and 524.)

WHITE COLUMBIA—See Stevens, Frederic B

WHITE-DIAMOND—See Matchless Metal Polish Co.

WHITE ROSE—See Stevens, Frederic B.

WILLIAMSVILLE Buff Mfg. Co., Danielson, Conn.

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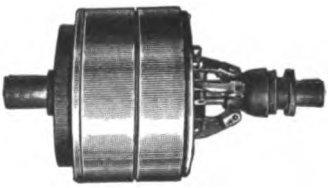

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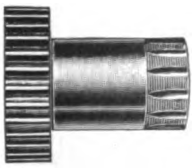

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COMPOUNDS (Continued)

CASE HARDENING COMPOUNDS

ACHILLES—See Houghton & Co.

BLACK DIAMOND—See Rogers & Hubbard Co.

BLAICH, Alfred O., 1956 Clybourn Ave., Chicago, Ill. (See page 469.)

BOHNITE—See Case Hardening Service Co.

CARBO—See Rodman Chemical Co.

CASE Hardening Service Co., Cleveland, O. "Bohnite," "Unicase."

GIBSON & Co., W. J., Chicago, Ill.

HOUGHTON & Co., E. F., Philadelphia, Pa. "Achilles," "Pearlite."

IDEAL Case-Hardening Compound Co., New York, N. Y.

KALUX—See Metal Hardening Solution Co.

KEYSTONE—See Rodman Chemical Co.

METAL Hardening Solution Co., Rochester, N. Y. "Kalux."

MORRIS & Co., Chicago, Ill.

MOSSO, C. A., Chicago, Ill.

PARK Chemical Co., Detroit, Mich. "Woodsides."

PEARLITE—See Houghton & Co.

PETTINOS Bros., Bethlehem, Pa.

PORTLAND—See Rogers & Hubbard Co.

RODMAN Chemical Co., East Pittsburg, Pa. "Carbo." "Keystone."

ROGERS & Hubbard Co., Middletown, Conn. "Black Diamond," "Standard," "Portland."

STANDARD—See Rogers & Hubbard Co.

STERLINGWORTH Charcoal Co., Cambridge, Mass.

UNICASE—See Case Hardening Service Co.

V. D.—See Van Doren Mfg. Co.

VAN Doren Mfg. Co., Chicago Heights, Ill. "V. D."

VINCENT Steel Process Co., Detroit, Mich.

WOODSIDES—See Park Chemical Co.

CORE COMPOUNDS

DETROIT Foundry Supply Co., Detroit, Mich. "Eureka."

EBONY—See Hill & Griffith Co.

EUREKA—See Detroit Foundry Supply Co.

GLUTRIN—See Robeson Process Co.

HILL & Griffith Co., Cincinnati, O. "Ebony," "Linoline."

HOLLAND Linseed Oil Co., Chicago, Ill.

KING KORE KOMPOUND—See Stevens, Frederic B.

LINOLINE—See Hill & Griffith Co.

McCORMICK Co., J. S., Pittsburg, Pa.

MILLS Mfg. Co., H. E., Syracuse, N. Y.

OBERMAYER Co., S., Cincinnati, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

ROBESON Process Co., Au Sable Forks, N. Y. "Glutrin."

STEVENS, Frederic B., Detroit, Mich. "King Kore Kompound." (See pages 523 and 524.)

VAN TILBURY Oil Co., Minneapolis, Minn.

POLISHING COMPOUNDS

(See Compounds, Buffing and Polishing)

WELDING COMPOUNDS

BANNER—See Cortland Specialty Co.

CORTLAND Specialty Co., Cortland, N. Y. "Banner," "Excelsior."

CORTLAND Welding Compound Co., Cortland, N. Y.

DINGEE, Mont. H., Lynchburg, Va. "Sparger's."

EXCELSIOR—See Cortland Specialty Co.

KREMBS & Co., Chicago, Ill. "Weldine."

SPARGER'S—See Dingee, Mont. H.

UNIVERSAL Fluxine Co., Urbana, O.

WELDINE—See Krembs & Co.

COUNTERBORES

AMERICAN Die & Tool Co., Reading, Pa. (See page 189.)

CLEVELAND Twist Drill Co., Cleveland, O.

CLOUGH, R. M., Tolland, Conn.

KENDRICK & Davis Co., Lebanon, N. H.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

WELLS & Son Co., F. E., Greenfield, Mass.

COUNTERSINKS

AMERICAN Die & Tool Co., Reading, Pa. (See page 189.)

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L., Millersburg, Pa.

CELFOR Tool Co., Buchanan, Mich.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

CLEVELAND Twist Drill Co., Cleveland, O.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 481.)

DEUSE, J. S., Chester, Conn.

DIAMOND—See Whitman & Barnes Mfg. Co.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Lightning," "Little Giant."

HARGRAVE—See Cincinnati Tool Co.

JOHNSON, Wm., Newark, N. J.

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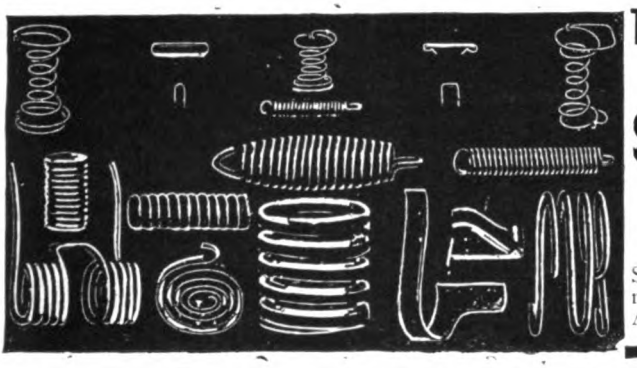

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KENDRICK & Davis Co., Lebanon, N. H.

KILBORN & Bishop Co., New Haven, Conn.

LIGHTNING—See Greenfield Tap & Die Co.

LITTLE GIANT—See Greenfield Tap & Die Co.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

MAYHEW Co., H. H., Shelburne Falls, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

SNELL Mfg. Co., Fishdale, Mass.

STANDARD Tool Co., Cleveland, O.

STARRETT Co., L. S., Athol, Mass.

SWAN Co., Jas., Seymour, Conn.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WELLS & Son Co., F. E., Greenfield, Mass.

WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

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ACME—See Moore Co.

BEACH Auto Turntable Co., T. C., St. Johns, Mich.

BOSTON & Lockport Block Co., Boston, Mass.

BURR Mfg. Co., Cleveland, O.

CAMERON Engineering Co., Washington, N. J.

CANTON Foundry & Machine Co., Canton, O. (See page 473.)

CHISHOLM-MOORE Mfg. Co., Cleveland, O. "Cyclone."

CYCLONE—See Chisholm-Moore Mfg. Co.

FORD Chain Block & Mfg. Co., Philadelphia, Pa. "Tribloc."

FRANKLIN Portable Crane & Hoist Co., Franklin, Pa.

HARRINGTON Son & Co., Edwin, Philadelphia, Pa. "Peerless."

IMPERIAL—See Ingersoll-Rand Co.

IMPERIAL—See Moore Co.

INGERSOLL-RAND Co., New York, N. Y. "Imperial." (See page 529.)

LAFAYETTE Engineering Co., Lafayette, Ind.

MILTON & Son, S. G., Franklin, Pa.

MOORE Co., Franklin, Winsted, Conn. "Acme," "Imperial."

NEW Jersey Foundry & Machine Co., New York, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PEERLESS—See Harrington Son & Co.

ROUND & Son, D., Cleveland, O. "Simplex," "Weston."

SIMPLEX—See Round & Son.

SPEIDEL, J. G., Reading, Pa.

STONE, Frank Porter, Chicago, Ill.

TRIBLOC—See Ford Chain Block & Mfg. Co.

UNION Elevator & Machine Co., Chicago, Ill.

WESTON—See Round & Son.

WRIGHT Mfg. Co., Lisbon, O.

YALE & Towne Mfg. Co., 9 E. 40th St., New York, N. Y. (See page 243.)

CRUCIBLES

METAL MELTING CRUCIBLES

BARTLEY Crucible Co., Jonathan, Trenton, N. J.

BAY State Crucible Co., Taunton, Mass.

BRIDGEPORT Crucible Co., Bridgeport, Conn.

DIXON Crucible Co., Joseph, Jersey City, N. J. (See page 191.)

GAUTIER & Co., J. H., Jersey City, N. J.

McCULLOUGH-DALZELL Crucible Co., Pittsburg, Pa.

ROSS-TACONY Crucible Co., Philadelphia, Pa.

SEIDEL, R. B., Philadelphia, Pa.

TAUNTON Crucible Co., Taunton, Mass.

CUPOLAS

FOUNDRY CUPOLAS

BYRAM & Co., Detroit, Mich.

CALUMET Foundry Equipment Co., Harvey, Ill.

DETROIT Foundry Supply Co., Detroit, Mich.

McCORMICK Co., J. S., Pittsburg, Pa.

McNEIL & Bro. Co., Jas., Pittsburg, Pa.

NEWTEN—See Northern Engineering Works.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich. "Newton."

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

WHITING Foundry Equipment Co., Harvey, Ill.

CUTTERS

BAR CUTTERS

(See Cutters, Rod and Bar)

GASKET CUTTERS

(See Cutters, Washer and Gasket)

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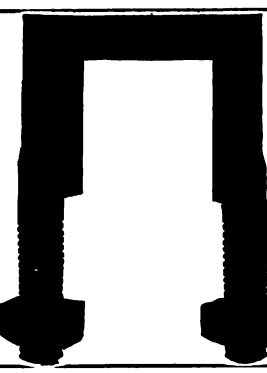

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CUTTERS (Continued)

MILLING CUTTERS

AMERICAN Die & Tool Co., Reading, Pa. (See page 189.)

BARBER-COLMAN Co., Rockford, Ill.

BECKER Milling Machine Co., Hyde Park, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CLEVELAND Twist Drill Co., Cleveland, O.

CLOUGH, R. M., Tolland, Conn.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 481.)

HUTHER Bros. Saw Mfg. Co., Rochester, N. Y.

ILLINOIS Tool Works, Chicago, Ill.

INGERSOLL Milling Machine Co., Rockford, Ill.

LINCOLN-WILLIAMS Twist Drill Co., Taunton, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Tool Co., Cleveland, O.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

STANDARD Tool Co., Cleveland, O.

TABOR Mfg. Co., Philadelphia, Pa. "Taylor-Newbold."

TAYLOR-NEWBOLD—See Tabor Mfg. Co.

TINDEL-MORRIS Co., Eddystone, Pa.

UNION Twist Drill Co., Athol, Mass.

UNIVERSAL Boring Machine Co., Hudson, Mass.

WHITNEY Mfg. Co., Hartford, Conn. (See page 115.)

PIPE CUTTERS

(Hand Power)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

AYES & Co., Chicago, Ill. "Barnes," "Saunders."

BARNES—See Ayes & Co.

BARNES—See Collmer Bros.

BARNES Tool Co., New Haven, Conn.

COLLMER Bros., South Bend, Ind. "Barnes," "Saunders."

ERIE Tool Works, Erie, Pa.

HOLLANDS Mfg. Co., Erie, Pa.

MARK Mfg. Co., Chicago, Ill.

OSWEGO Tool Co., Oswego, N. Y.

REED Mfg. Co., Erie, Pa.

SAUNDERS—See Ayes & Co.

SAUNDERS—See Collmer Bros.

SAUNDERS Sons, D., Yonkers, N. Y.

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., Roxbury, Mass. "Trimo." (See page 555.)

WELLS & Son Co., F. E., Greenfield, Mass.

ROD AND BAR CUTTERS

(Hand Power)

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill "Marvel."

BELDEN Machine Co., New Haven, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

MARVEL—See Armstrong-Blum Mfg. Co.

MERWIN Mfg. Co., Erie, Pa. "Vulcan."

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

VULCAN—See Merwin Mfg. Co.

WALLACE Supply Co., Chicago, Ill.

SPRUE CUTTERS

BARNETT Foundry Co., Oscar, Irvington N. J.

BLISS Co., E. W., Brooklyn, N. Y.

BRASS Founders Supply Co., Newark, N. J.

SHUSTER Co., F. B., New Haven, Conn.

STANDARD Machinery Co., Auburn, R. I. (See page 431.)

STOLL Co., D. H., Buffalo, N. Y.

TOLEDO Machine & Tool Co., Toledo, O.

TURNER Machine Co., Philadelphia, Pa.

WASHER OR GASKET CUTTERS

BONNEY Vise & Tool Works, Allentown, Pa. "Cooper."

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

COOPER—See Bonney Vise & Tool Works.

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVE—See Cincinnati Tool Co.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 539.)

ROSE, J. A., Hastings, Neb.

SHAWVER Co., Springfield, O.

SMITH, Otis A., Rockfall, Conn.

STORTZ & Son, John, Philadelphia, Pa.

WOOD FORMING CUTTERS

SHIMER & Sons, Samuel J., Milton, Pa.

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SCREW CUTTING DIES

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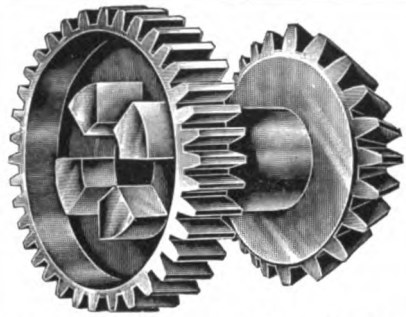

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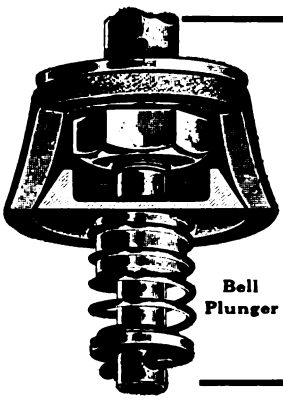

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DIVIDERS

DIVIDERS AND CALIPERS

(See Calipers and Dividers)

DOGS

LATHE DOGS

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

BESLY & Co., Charles H., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

BONNEY Vise & Tool Works, Allentown, Pa. "Indispensable."

COLLMER Bros., South Bend, Ind. "Le Count."

INDISPENSABLE—See Bonney Vise & Tool Works.

LE COUNT—See Collmer Bros.

LE COUNT, Wm. G., South Norwalk, Conn.

MARK Mfg. Co., Chicago, Ill.

NATIONAL—See Oneida National Chuck Co.

O. K. Tool Holder Co., Shelton, Conn.

ONEIDA National Chuck Co., Oneida, N. Y. "National."

OSWEGO Tool Co., Oswego, N. Y.

PHOENIX Hardware Co., Buffalo, N. Y.

READY Tool Co., Bridgeport, Conn. "Red-E."

RED-E—See Ready Tool Co.

STRASBURGER Mfg. Co., Chicago, Ill.

UNION Caliper Co., Orange, Mass.

UNION Elevator & Machine Co., Chicago, Ill.

VULCAN—See Williams & Co.

WEST Steel Casting Co., Cleveland, O.

WILLIAMS & Co., J. H., Brooklyn, N. Y. "Vulcan."

DOWELS

PATTERN MAKERS DOWELS

BENSKIN Mfg. Co., Canton, O. "Perfect."

BUTLER, A. G., New York, N. Y.

CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

MORSE, Frank W., Boston, Mass.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

WELLMAN Pattern-Supply Co., Cleveland, O.

WINKLEY Co., Detroit, Mich. (See page 79.)

DRESSERS

EMERY WHEEL DRESSERS

BALDWIN, Tuthill & Bolton, Grand Rapids, Mich.

BAY State Stamping Co., Worcester, Mass. "Bennett."

BENNETT—See Bay State Stamping Co.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWNE & Dowd Mfg. Co., Meriden, Conn.

CALDER, Geo. H., Lancaster, Pa.

CHALLENGE Machine Co., Philadelphia, Pa.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. "Huntington." (See pages 227 and 343.)

CLIZBE Bros. Mfg. Co., Plymouth, Ind. "Crown."

COLLMER Bros., South Bend, Ind. "Huntington."

COLUMBUS Bolt Works, Columbus, O.

CRAFTS, Arthur A., Boston, Mass.

CROWN—See Clizbe Bros. Mfg. Co.

DESMOND-STEPHAN Mfg. Co., Urbana, O. "Diamo-Carbo," "Sherman," "Huntington."

DETROIT Screw Works, Detroit, Mich. "Huntington." (See page 341.)

DIAMO-CARBO—See Desmond-Stephan Mfg. Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DIAMOND Tool Co., Chicago, Ill.

ERIE Tool Works, Erie, Pa.

HUNTINGTON—See Chicago Screw Co.

HUNTINGTON—See Collmer Bros.

HUNTINGTON—See Desmond-Stephan Mfg. Co.

HUNTINGTON—See Detroit Screw Works.

HUNTINGTON—See Mark Mfg. Co.

MARK Mfg. Co., Chicago, Ill. "Huntington."

NORTH Wales Machine Co., North Wales, Pa.

OSGOOD, J. L., Buffalo, N. Y.

PENINSULA Emery Wheel Co., Detroit, Mich.

QUADRIGA Mfg. Co., Chicago, Ill. "Rearwin."

REARWIN—See Quadriga Mfg. Co.

REED Mfg. Co., Erie, Pa.

SHERMAN—See Desmond-Stephan Mfg. Co.

STANDARD Tool Co., Cleveland, O.

STERLING—See Diamond Saw & Stamping Works.

STERLING Grinding Wheel Co., Tiffin, O.

STRICKLAND, E. M., Detroit, Mich.

VINCENT Steel Process Co., Detroit, Mich.

WESTERN Tool & Mfg. Co., Springfield, O.

WRIGLEY Co., Thomas, Chicago, Ill.

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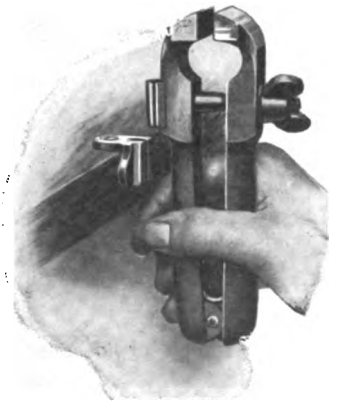

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GOODELL-PRATT Co., Greenfield, Mass.

LANCASTER Machine & Knife Works, Lancaster, N. Y. "McClellan."

McCLELLAN—See Lancaster Machine & Knife Works.

MALLEABLE Iron Fittings Co., Branford, Conn. "Mifco." (See page 477.)

MIFCO—See Malleable Iron Fittings Co.

MILLERS Falls Co., New York, N. Y.

NORTH Bros. Mfg. Co., Philadelphia, Pa. "Yankee."

PECK, Stow & Wilcox Co., Southington, Conn.

TURNER & Deegan, Bristol, Conn.

YANKEE—See North Bros. Mfg. Co.

CENTERING DRILLS

CLEVELAND Twist Drill Co., Cleveland, O.

SLOCOMB Co., J. T., Providence, R. I.

PNEUMATIC DRILLS

(See Tools, Pneumatic)

ELECTRIC PORTABLE DRILLS, GRINDERS AND POLISHERS

AMERICAN Electric Tool Co., West Newton, Mass. "Carver."

CARVER—See American Electric Tool Co.

CHICAGO Pneumatic Tool Co., Chicago, Ill. "Duntley."

CINCINNATI Electrical Tool Co., Cincinnati, O. "Peerless."

CLARK, Jr., Electric Co., James, Louisville, Ky. "Willey."

COATES Clipper Mfg. Co., Worcester, Mass.

CRANE, H. G., Brookline, Mass.

DEER Co., A. J., Hornell, N. Y. "Royal."

DUNTLEY—See Chicago Pneumatic Tool Co.

GEM Mfg. Co., Pittsburg, Pa.

HISEY-WOLF Machine Co., Cincinnati, O.

IDEAL—See Smith Electric Tool Co.

PEERLESS—See Cincinnati Electrical Tool Co.

PEERLESS—See United Mfg. Co.

PLANK Flexible Shaft Machine Co., Grand Rapids, Mich.

RACINE Electric Co., Racine, Wis.

ROYAL—See Deer Co.

SMITH Electric Tool Co., Cincinnati, O. "Ideal."

STANDARD Electric Tool Co., Cincinnati, O.

STOW Flexible Shaft Co., Philadelphia, Pa.

STOW Mfg. Co., Binghamton, N. Y.

TEMCO Electric Motor Co., Leipsic, O.

UNITED Mfg. Co., 1015 Commerce Bldg., Kansas City, Mo. "Peerless."

UNITED States Electrical Tool Co., Cincinnati, O. (See page 479.)

VAN DORN Electric Tool Co., Cleveland, O.

WILLEY—See Clark, Jr., Electric Co.

MULTIPLE SPINDLE DRILLING MACHINES

BAUSH Machine Tool Co., Springfield, Mass.

FOOTE-BURT Co., Cleveland, O.

FOX Machine Co., Grand Rapids, Mich.

GARDAM & Son, Wm., New York, N. Y.

MOLINE Tool Co., Moline, Ill.

NATCO—See National Automatic Tool Co.

NATIONAL Automatic Tool Co., Richmond, Ind. "Natco."

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

SCALLAN & Co., W. E., Cincinnati, O.

POST DRILLING MACHINES

ADVANCE—See Silver Mfg. Co.

AMERICAN Foundry & Mfg. Co., St. Louis, Mo.

BAUSH Machine Tool Co., Springfield, Mass.

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Western Chief."

CHAMPION Blower & Forge Co., Lancaster, Pa.

GREEN RIVER—See Greenfield Tap & Die Co.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Green River."

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

LITTLE GIANT—See Noyes & Co.

NOYES & CO., B. B., Greenfield, Mass. "Little Giant."

SILVER Mfg. Co., Salem, O. "Advance."

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

RADIAL DRILLING MACHINES

AMERICAN Tool Works Co., Cincinnati, O.

BAUSH Machine Tool Co., Springfield, Mass.

CINCINNATI-BICKFORD Tool Co., Cincinnati, O.

DRESES Machine Tool Co., Cincinnati, O.

FOSDICK Machine Tool Co., Cincinnati, O.

GANG CO., Wm. E., Cincinnati, O.

HILBERT Machine Co., Cincinnati, O.

MORRIS Machine Tool Co., John B., Cincinnati, O.

MUELLER Machine Tool Co., Cincinnati, O.

NILES-BEMENT-POND CO., New York, N. Y.

REED-PRENTICE Co., Worcester, Mass.

TAYLOR & Fenn Co., Hartford, Conn.

WESTERN Machine Tool Works, Holland, Mich

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⅜" drill, weight 14 pounds

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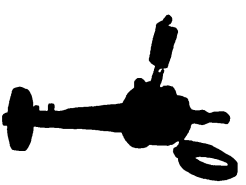

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ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

ATHA Tool Co., Newark, N. J.

BILLINGS & Spencer Co., Hartford, Conn. "Packer."

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

DIAMOND—See Whitman & Barnes Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant."

HUNTER Machine Co., Jas., North Adams, Mass.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Monarch," "Weston."

LITTLE GIANT—See Greenfield Tap & Die Co.

LOWELL Wrench Co., Worcester, Mass.

MILLERS Falls Co., New York, N. Y.

MONARCH—See Keystone Mfg. Co.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

OSWEGO Tool Co., Oswego, N. Y. "Packer."

PACKER—See Billings & Spencer Co.

PACKER—See Oswego Tool Co.

PARKER Co., Charles, Meriden, Conn.

PECK, Stow & Wilcox Co., Southington, Conn.

PRATT & Whitney Co., Hartford, Conn. "Renshaw." (See page 457.)

RENSHAW—See Pratt & Whitney Co.

WESTON—See Keystone Mfg. Co.

WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

SENSITIVE DRILLING MACHINES

AVEY—See Cincinnati Pulley Machinery Co.

BURKE Machine Tool Co., Conneaut, O.

CINCINNATI Pulley Machinery Co., Cincinnati, O. "Avey."

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

FOX Machine Co., Grand Rapids, Mich.

GARDAM & Son, Wm., New York, N. Y.

HAMILTON Machine Tool Co., Hamilton, O.

HENRY & Wright Mfg. Co., Hartford, Conn.

HOYSRADT & Case, Kingston, N. Y.

KNIGHT Machinery Co., W. B., St. Louis, Mo.

LANGELIER Mfg. Co., Providence, R. I.

LELAND-GIFFORD Co., Worcester, Mass.

NATIONAL Machine Co., Hartford, Conn.

NORTH Wales Machine Co., North Wales, Pa.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

REED Co., Francis, Worcester, Mass.

REED-PRENTICE Co., Worcester, Mass.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

ROCKWELL—See Ryerson & Son.

RYERSON & Son, Joseph T., Chicago, Ill. "Rockwell."

SLOAN & Chace Mfg. Co., Newark, N. J.

STAPF & Co., John B., Dunkirk, N. Y.

TAYLOR & Fenn Co., Hartford, Conn.

VILLINGER Mfg. Co., Williamsport, Pa. "Williamsport."

WASHBURN Shops, Worcester, Mass.

WILLIAMSPORT—See Villinger Mfg. Co.

TURRET DRILLING MACHINES

NATIONAL Separator & Machine Co., Boston, Mass.

QUINT, A. D., Hartford, Conn.

TURNER Machine Co., Danbury, Conn.

TWIST DRILLS

CELFOR Tool Co., Buchanan, Mich.

CLEVELAND Twist Drill Co., Cleveland, O. "Paragon."

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 481.)

DIAMOND—See Whitman & Barnes Mfg. Co.

LINCOLN-WILLIAMS Twist Drill Co., Taunton, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

NEW Process Twist Drill Co., Taunton, Mass.

NORKA—See Whitman & Barnes Mfg. Co.

PARAGON—See Cleveland Twist Drill Co.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

RICH Tool Co., Chicago, Ill.

STANDARD Tool Co., Cleveland, O.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

UNION Twist Drill Co., Athol, Mass.

WHITMAN & Barnes Mfg. Co., Akron, O. "Norka," "Diamond."

UPRIGHT DRILLING MACHINES

AURORA Tool Works, Aurora, Ind.

BAKER Bros., Toledo, O.

BARNES Co., W. F. & John, Rockford, Ill.

BARNES Drill Co., Rockford, Ill.

BARR, H. G., Worcester, Mass.

CINCINNATI-BICKFORD Tool Co., Cincinnati, O.

COLBURN Machine Tool Co., Franklin, Pa.

DAVIS Machine Co., W. P., Rochester, N. Y.

FRONTIER Iron Works, Buffalo, N. Y.

HAMILTON Machine Tool Co., Hamilton, O.

HILBERT Machine Co., Cincinnati, O.

HOEFER Mfg. Co., Freeport, Ill.

KERN Machine Tool Co., Hamilton, O.

KNIGHT Machinery Co., W. B., St. Louis, Mo.

KOKOMO—See Superior Machine Tool Co.

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REED-PRENTICE Co., Worcester, Mass.

ROCKFORD Drilling Machine Co., Rockford, Ill.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

ROCKFORD Machine Tool Co., Rockford, Ill.

SIBLEY Machine Tool Co., South Bend, Ind.

SNYDER & Son, J. E., Worcester, Mass.

SUPERIOR Machine Tool Co., Kokomo, Ind. "Kokomo."

TAYLOR & Fenn Co., Hartford, Conn.

TSCHUDI-McBARRON Machine Co., Dayton, O.

DRIVERS

SCREW DRIVERS

AUTODRIVER—See Bridgeport Hardware Mfg. Corp.

BILLINGS & Spencer Co., Hartford, Conn.

BISMARCH—See Bridgeport Hardware Mfg. Corp.

BLACKSTONE—See Bridgeport Hardware Mfg. Corp.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J. "New Century," "O. K.," "Ideal," "Peerless."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn. "Autodriver," "Gripshank," "Perfecto," "Blackstone," "Challenge," "Warwick," "Bismarch," "Hercules," "Lead-All," "Matchless."

BROWN & Co., R. H., New Haven, Conn. "Clark's."

BUFFUM Tool Co., Louisiana, Mo.

CASSADY-FAIRBANK Mfg. Co., Chicago, Ill.

CHALLENGE—See Bridgeport Hardware Mfg. Corp.

CHAMPION—See Union Hardware Co.

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

CLARK'S—See Brown & Co.

CRONK & Carrier Mfg. Co., Elmira, N. Y. "Elmira." "Star."

DICKE Tool Co., Downers Grove, Ill.

DIKEMAN Mfg. Co., Norwalk, Conn.

DISSTON Sons, Henry, Philadelphia, Pa.

ELMIRA—See Cronk & Carrier Mfg. Co.

ELMORE Tool Mfg. Co., Hartford, Conn. "Star," "Hartford."

ERIE Specialty Co., Erie, Pa. "Walker."

ERIE Stamping & Mfg. Co., Erie, Pa. "Esco."

ESCO—See Erie Stamping & Mfg. Co.

GAY, Geo. E., Augusta, Me.

GIANT—See Tuck Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass.

GRIPSHANK—See Bridgeport Hardware Mfg. Corp.

HARGRAVE—See Cincinnati Tool Co.

HARTFORD—See Elmore Tool Mfg. Co.

HERBRAND Co., Fremont, O.

HERCULES—See Tuck Mfg. Co.

HERCULES—See Bridgeport Hardware Mfg. Corp.

HURWOOD—See Stanley Rule & Level Co.

IDEAL—See Braunsdorf-Mueller Co.

IRVINGTON Mfg. Co., Irvington, N. J.

IVES Mfg. Co., W. A., Wallingford, Conn. "Mephisto."

JOHNSON, Wm., Newark, N. J.

LEAD-ALL—See Bridgeport Hardware Mfg Corp.

LIPSCOMB—See Ellis Co.

MARBLE Arms & Mfg. Co., Gladstone, Mich.

MATCHLESS—See Bridgeport Hardware Mfg. Corp.

MAYHEW Co., H. H., Shelburne Falls, Mass. "Monarch," "Peerless."

MEPHISTO—See Ives Mfg. Co.

MONARCH—See Mayhew Co.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 539.)

NEVER BREAK—See S. & I. Co.

NEW CENTURY—See Braunsdorf-Mueller Co.

NORTH Bros. Mfg. Co., Philadelphia, Pa. "Yankee."

O. K.—See Braunsdorf-Mueller Co.

OHIO Tool Co., Charleston, W. Va.

PEERLESS—See Braunsdorf-Mueller Co.

PEERLESS—See Mayhew Co.

PERFECT HANDLE—See Smith & Co.

PERFECTO—See Bridgeport Hardware Mfg. Corp.

RELIABLE—See S. & I. Co.

RIVAL—See S. & I. Co.

S. & I. Co., Springfield, Mass. "Never Break," "Reliable," "Rival."

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SNELL Mfg. Co., Fishdale, Mass.

STANLEY Rule & Level Co., New Britain, Conn. "Hurwood."

STAR—See Cronk & Carrier Mfg. Co.

STAR—See Elmore Tool Mfg. Co.

STARRETT Co., L. S., Athol, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SWAN Co., Jas., Seymour, Conn.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass. "Hercules," "Giant."

TURNER & Deegan, Bristol, Conn.

UNION Hardware Co., Torrington, Conn. "Champion," "Valley."

VALLEY—See Union Hardware Co.

VLCHEK Tool Co., Cleveland, O.

WALKER—See Erie Specialty Co.

WARWICK—See Bridgeport Hardware Mfg. Corp.

WRIGHT Wrench & Forging Co., Canton, O.

YANKEE—See North Bros. Mfg. Co.

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DRYERS

CENTRIFUGAL DRYERS

AMERICAN Tool & Machine Co., Boston, Mass. "Weston." **(See page 515.)**

WESTON—See American Tool & Machine Co.

SAND DRYERS

PANGBORN Corp., Hagerstown, Md.

ELEVATORS

GARAGE ELEVATORS

BRODESSER Mfg. Co., Milwaukee, Wis.

COHOES Iron Foundry & Machine Co., Cohoes, N. Y.

EATON & Prince Co., Chicago, Ill.

HAUGHTON Elevator & Machine Co., Toledo, O.

KIECKHEFER Elevator Co., A., Milwaukee, Wis.

McLAUTHLIN Co., Geo. T., Boston, Mass.

OTIS Elevator Co., New York, N. Y.

REEDY Co., H. J., Cincinnati, O.

REEDY Elevator Co., Hoboken, N. J.

REEDY Elevator Mfg. Co., J. W., Chicago, Ill.

SEDGWICK Machine Works, New York, N. Y.

SIDNEY Elevator Mfg. Co., Sidney, O.

STORM Mfg. Co., Newark, N. J.

UNION Elevator & Machine Co., Chicago, Ill.

WARNER Elevator Mfg. Co., Cincinnati, O.

EXPANDERS

BOILER TUBE EXPANDERS

AJAX Mfg. Co., Pittsburg (N. S.), Pa.

FORG, Peter, Somerville, Mass.

EXTINGUISHERS

FIRE EXTINGUISHERS

ACCURATE—See National Metal Stamping & Mfg. Co.

ACME—See Rex Fire Appliance Co.

BADGER Chemical Mfg. Co., Milwaukee, Wis. "Mitchell," "Copper King," "Wisconsin."

BENTON—See Chemi Co.

BADGER & Sons Co., E. B., Boston, Mass.

BOYD & Bro., James, Philadelphia, Pa. "Keystone," "Paragon," "Marvello."

CHEMI Co., Richmond, Va. "Benton," "Jupiter."

CHILDS Co., O. J., Utica, N. Y. "Utica."

CHOKE-FIRE—See National Metal Stamping & Mfg. Co.

COPPER KING—See Badger Chemical Mfg. Co.

ECLIPSE—See Haverhill Fire Appliance Co

EMMONS Specialty Co., Detroit, Mich. "Esco."

ESCO—See Emmons Specialty Co.

EVER Ready Mfg. Co., Buffalo, N. Y.

FIRE-FLY—See Northwestern Chemical Co.

FYRO Extinguisher Co., Syracuse, N. Y.

HARRIS Fire Apparatus Co., New York, N. Y.

HAVERHILL Fire Appliance Co., Haverhill, Mass. "Eclipse."

HAYWARD & Co., S. F., New York, N. Y.

HOME Chemical Co., Rochester, N. Y.

J-M FYRO—See Johns-Manville Co.

J-M SUCCESS—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "Manville," "J-M Success," "J-M Fyro."

JOLIET—See Wilcox Co.

JUPITER—See Chemi Co.

KAHNWEILER'S Sons, David, New York, N. Y. "Simplex."

KEYSTONE—See Boyd & Bro.

LA MAY Mfg. Co., Rochester, N. Y.

LAZARUS Mfg. Co., 746 Euclid Ave., Cleveland, O.

LIBERTY Fire Extinguisher Co., Chicago, Ill.

LIQUID Carbonic Co., Chicago, Ill.

MANVILLE—See Johns-Manville Co.

MARTEN—See National Metal Stamping & Mfg. Co.

MARVELLO—See Boyd & Bro.

MINIMAX Co., New York, N. Y.

MITCHELL—See Badger Chemical Mfg. Co.

NATIONAL Metal Stamping & Mfg. Co., Newark, N. J. "Accurate," "Marten," "Peerless," "Choke-Fire," "Newark."

NEVERMYSS Fire Extinguisher Co., Middletown, N. Y.

NEWARK—See National Metal Stamping & Mfg. Co.

NORTHWESTERN Chemical Co., Marietta, O. "Fire-Fly." **(See page 129.)**

PARAGON—See Boyd & Bro.

PEERLESS—See National Metal Stamping & Mfg. Co.

PHOENIX—See Rex Fire Appliance Co.

PHOENIX Fire Appliance Co., New York, N. Y.

PROSPECT Mfg. Co., Prospect, O.

PYRENE Mfg. Co., 1358 Broadway, New York, N. Y. **(See page 161.)**

REX Fire Appliance Co., New York, N. Y. "Phoenix," "Acme," "Victor."

SIMPLEX—See Kainweiler's Sons.

STEMPEL Fire Extinguisher Co., St. Louis, Mo.

U. S.—See United Mfg. Co.

UNITED Mfg. Co., Toledo, O. "U. S."

UTICA—See Childs Co.

VICTOR—See Rex Fire Appliance Co.

WILCOX Co., Chas. C., Enid, Okla. "Joliet."

WISCONSIN—See Badger Chemical Mfg. Co.

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WALTON Co., Hartford, Conn.

FACINGS

FOUNDRY FACINGS AND PARTINGS

BROOKLYN Facing Mills, Brooklyn, N. Y.

CENTRAL Foundry Supply Co., Columbus, O.

DETROIT Foundry Supply Co., Detroit, Mich. "Eureka."

DIXON Crucible Co., Joseph, Jersey City, N. J.
(See page 191.)

DOGGETT, Stanley, New York, N. Y.

EASTERN Facing Mills, Williamsport, Pa.

EUREKA—See Detroit Foundry Supply Co.

FOUNDRY Specialty Co., Cincinnati, O. "Partine."

HILL & Griffith Co., Cincinnati, O.

KELLY & Co., T. P., Hamilton, O

McCORMICK Co., J. S., Pittsburg, Pa.

PARTINE—See Foundry Specialty Co.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 517.)

PETTINOS Bros., Bethlehem, Pa.

SPRINGFIELD Facing Co., Springfield, Mass.

STEVENS, Frederic B., Detroit, Mich.
(See pages 523 and 524.)

UNITED STATES Graphite Co., Saginaw, Mich.

FASTENERS

BELT FASTENERS

BUFFALO Specialty Co., Buffalo, N. Y.

BLAKES—See Greene, Tweed & Co.

CRESCENT Belt Fastener Co., New York, N. Y.

GREENE, Tweed & Co., New York, N. Y. "Blakes," "Morans."

JENCKES Mfg. Co., E., Worcester, Mass.

MORANS—See Greene, Tweed & Co.

QUADRIGA Mfg. Co., Chicago, Ill.

SMITH & Co., F. P., Sharon Hill, Pa. "Smithicks."

SMITHICKS—See Smith & Co.

FILES

FILES AND RASPS

AKRON File Co., Akron, O.

AMERICAN—See Nicholson File Co.

AMERICAN Swiss File & Tool Co., New York, N. Y.

ARCADE—See Nicholson File Co.

BARNETT Co., C. & H., Philadelphia, Pa. "Black Diamond."

BETTER-CUT—See Racine File Co.

BLACK DIAMOND—See Barnett Co.

CHATTERTON File Works, Providence, R. I.

CHELSEA File Works, Norwich, Conn.

COLONIAL File Co., Neponset, Mass. "Puritan."

DELTA File Works, Philadelphia, Pa.

DISSTON & Sons, H., Philadelphia, Pa.

EAGLE—See Nicholson File Co.

GEM City File Works Co., Quincy, Ill.

GOLD MEDAL—See Liveright Bros.

GRAVES File Co., Newark, N. J.

GREAT WESTERN—See Nicholson File Co.

GROBET—See Montgomery & Co.

HAYES File Co., Detroit, Mich.

HELLER Bros. Co., Newark, N. J.

J. B. SMITH—See Nicholson File Co.

JOHNSON & Bro., Newark, N. J. "Reliance."

KEARNEY & FOOT—See Nicholson File Co.

LIVERIGHT Bros., Philadelphia, Pa. "Gold Medal."

McCAFFREY File Co., Philadelphia, Pa.

McCLELLAN—See Nicholson File Co.

MADDEN & Morrison File Co., Middletown, N. Y.

MONTGOMERY & Co., 105-07 Fulton St., New York, N. Y. (Importers.) "Grobet."
(See page 551.)

MURCOTT & Campbell, Brooklyn, N. Y.

NICHOLSON File Co., Providence, R. I. "American," "Arcade," "Eagle," "XF," "McClellan," "Kearney & Foot," "J. B. Smith," "Great Western."
(See page 487.)

PURITAN—See Colonial File Co.

RACINE File Co., Racine, Wis. "Better-cut."

RELIANCE—See Johnson & Bro.

REX File & Saw Co., Newcomerstown, O.

REYNOLDS Bros., Columbus, O.

SIMONDS Mfg. Co., Fitchburg, Mass.

STANDARD Roller Bearing Co., Philadelphia, Pa. "Vixen."

TROJAN—See Troy File Works.

TROY File Works, Troy, N. Y. "Trojan."

VIXEN—See Standard Roller Bearing Co.

WESTPHAL File Co., Milwaukee, Wis.

XF—See Nicholson File Co.

FILLETS

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BENSKIN Mfg. Co., Canton, O. "Perfect."

BUTLER, A. G., New York, N. Y.

CLEVELAND Galvanizing Works Co., Cleveland, O.

EVERETT & Son, A., Auburn, N. Y.

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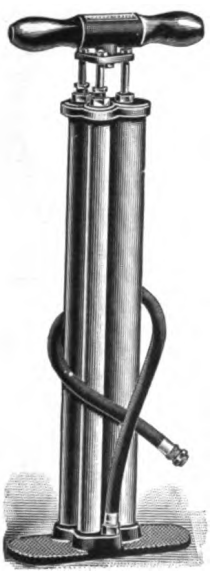

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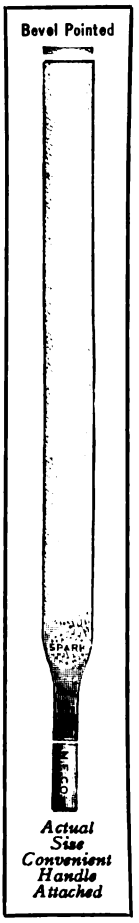

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PAGE Belting Co., Concord, N. H.

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

WELLMAN Pattern-Supply Co., Cleveland, O.

FLASKS

FOUNDRY FLASKS

ADAMS Co., Dubuque, Ia.

BALDWIN, Tuthill & Bolton, Grand Rapids, Mich.

BARNETT Foundry Co., Oscar, Irvington, N. J.

BRASS Foundries Supply Co., Newark, N. J.

BUCH'S Sons Co., A., Elizabethtown, Pa.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EUREKA—See Smith & Caffrey Co.

HILL & Griffith Co., Cincinnati, O.

OBERMAYER Co., S., Cincinnati, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

SMITH & Caffrey Co., Syracuse, N. Y. "Eureka."

STERLING Wheelbarrow Co., Milwaukee, Wis.

FLUX

BRAZING FLUX

(See Compounds, Brazing)

SOLDERING FLUX

ALLEN Co., L. B., Chicago, Ill. "Sun," "Sampson."

ALUMALUX Co., Sidney, O. "Rajah."

BARCY-NICHOLSON Co., Detroit, Mich.

BENSON Co., Alex. R., Hudson, N. Y. "Yagers."

BLAKE Signal & Mfg. Co., Boston, Mass.

BRUNNER Chemical Works, Cincinnati, O. "Queen."

BURNLEY Battery & Mfg. Co., North East, Pa.

CALLAHAN & Co., Geo., New York, N. Y.

CRESCENT—See McGill Mfg. Co.

DIELECTRIC Mfg. Co., St. Louis, Mo.

DUNTON Co., M. W., Providence, R. I. "Nokorode."

ELLIOTT Chemical Works, Newton, Mass.

EUREKA—See Grasselli Chemical Co.

GRASSELLI Chemical Co., New York, N. Y "Standard," "Eureka."

HESS & Son, Philadelphia, Pa. "Tinol."

ILLINOIS Smelting & Refining Co., Chicago, Ill.

INCOMPARABLE—See Reade Mfg. Co.

KALBFLEISCH Co., Franklin H., Broadway & 16th St., New York, N. Y. (See page 245.)

KREMBS & Co., Chicago, Ill.

McGILL Mfg. Co., Valparaiso, Ind. "Crescent," "Star."

NOKORODE—See Dunton Co.

PEERLESS—See Solderall Co.

QUEEN—See Brunner Chemical Works.

RAJAH—See Alumalux Co.

READE Mfg. Co., Hoboken, N. J. "Incomparable," "Readina."

READINA—See Reade Mfg. Co.

RED LETTER—See Ruby Chemical Co.

RUBY Chemical Co., Columbus, O. "Red Letter."

SAMPSON—See Allen Co.

SCHNEIDER, Emil, Newark, N. J.

SOLDERALL Co., New York, N. Y. "Peerless."

STANDARD—See Grasselli Chemical Co.

STAR—See McGill Mfg. Co.

SUN—See Allen Co.

TINOL—See Hess & Son.

TRIAD Co., Belmar, N. J.

UNIVERSAL Fluxine Co., Urbana, O.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

YAGERS—See Benson Co.

WELDING FLUX

(See Compounds, Welding)

FORGES

BLACKSMITHS FORGES

BILLINGS & Spencer Co., Hartford, Conn.

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Royal," "Western Chief," "Challenge," "Hero," "Leader."

CANTON Foundry & Machine Co., Canton, O. (See page 473.)

CHALLENGE—See Canedy-Otto Mfg. Co.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CLEVELAND Steam Gauge Co., Cleveland, O. "Watsons."

HERO—See Canedy-Otto Mfg. Co.

LEADER—See Canedy-Otto Mfg. Co.

ROYAL—See Canedy-Otto Mfg. Co.

SILVER Mfg. Co., Salem, O.

STURTEVANT Co., B. F., Hyde Park, Mass.

WATSONS—See Cleveland Steam Gauge Co.

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

Complete Index to Classification appears on Pages 8 to 26.

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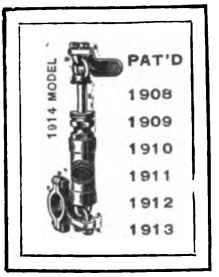

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(For Hack Saw Blades—See Blades, Hack Saw)

ATKINS & Co., E. C., Indianapolis, Ind. "Hoosier," "Indiana."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.

BUFFUM Tool Co., Louisiana, Mo.

CROWN—See Union Hardware Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DIKEMAN Mfg. Co., Norwalk, Conn.

DISSTON & Sons, Henry, Philadelphia, Pa. "Eagle," "Keystone."

EAGLE—See Disston & Sons.

EAGLE—See Union Hardware Co.

GOODELL-PRATT Co., Greenfield, Mass.

GRIFFIN Co., G. W., Franklin, N. H.

HOOSIER—See Atkins & Co.

INDIANA—See Atkins & Co.

IRVINGTON Mfg. Co., Irvington, N. J.

JENNINGS & Co., C. E., New York, N. Y.

KEYSTONE—See Disston & Sons.

MASSACHUSETTS Saw Works, Springfield, Mass. "Victor."

MILLERS Falls Co., New York, N. Y. "Star."

QUALITY Saw & Tool Works, Springfield, Mass.

S. & I. Co., Springfield, Mass.

SIMONDS Mfg. Co., Fitchburg, Mass.

STAR—See Millers Falls Co.

STARRETT Co., L. S., Athol, Mass.

STERLING—See Diamond Saw & Stamping Works.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNION Caliper Co., Orange, Mass.

UNION Hardware Co., Torrington, Conn. "Crown," "Eagle."

UNIVERSAL—See West Haven Mfg. Co.

UTILITY—See West Haven Mfg. Co.

VICTOR—See Massachusetts Saw Works.

WEST Haven Mfg. Co., New Haven, Conn. "Utility," "Universal."

FULLERS

FULLERS AND SWAGES

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

EVANSVILLE Tool Works, Evansville, Ind.

HELLER Bros. Co., Newark, N. J.

KLEIN-LOGAN Co., Pittsburg, Pa.

LITTLE GIANT—See Noyes & Co.

NOYES & Co., B. B., Greenfield, Mass. "Little Giant."

SWETT Iron Works, A. L., Medina, N. Y.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

FUNNELS

GASOLINE FUNNELS

ATLANTIC Stamping Co., Rochester, N. Y.

BEST, R. L., Bismarck, N. Dak.

CENTRAL Stamping Co., New York, N. Y. "Puritan."

DOVER Stamping & Mfg. Co., Cambridge, Mass. "Saval." (See page 97.)

ENTORP Filter Co., Amboy, Ill.

HOAGLIN Mfg. Co., F. L., Waupaca, Wis. "Nospill."

MASON Co., Geo. H., Boston, Mass.

NATIONAL Enameling & Stamping Co., New York, N. Y.

NO-SHAMMY Products Co., Cleveland, O.

NOSPILL—See Hoaglin Mfg. Co.

PURITAN—See Central Stamping Co.

PURITAN—See Sexton Can Co.

SAVAL—See Dover Stamping & Mfg. Co.

SEXTON Can Co., Boston, Mass. "Puritan."

VOGEL & Bros., Wm., Brooklyn, N. Y.

WALLMAN Mfg. Co., Milwaukee, Wis.

WILSON & Co., F. Cortez, Chicago, Ill.

FURNACES

ANNEALING AND CASE HARDENING FURNACES

AMERICAN Gas Furnace Co., 24 John St., New York, N. Y. (See page 491.)

BELLEVUE Furnace Co., Detroit, Mich.

BEST, W. N., New York, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

BUCKEYE—See Macleod Co.

CHICAGO Flexible Shaft Co., Chicago, Ill. "Stewart."

FOUNDRY Equipment Co., Buffalo, N. Y.

GANTT—See Witteman Co.

GILBERT & Barker Mfg. Co., Springfield, Mass.

HOSKINS Mfg. Co., Detroit, Mich.

MACLEOD Co., Cincinnati, O. "Buckeye."

ROCKWELL Co., W. S., New York, N. Y.

SCOTT, C. U., Davenport, Ia.

STEWART—See Chicago Flexible Shaft Co.

TATE-JONES & Co., Pittsburg, Pa.

WESTMACOTT Gas Furnace Co., Providence, R. I.

WHITING Foundry Equipment Co., Harvey, Ill.

BABBITT MELTING FURNACES

AMERICAN Gas Furnace Co., 24 John St., New York, N. Y. (See page 491.)

CHICAGO Flexible Shaft Co., Chicago, Ill.

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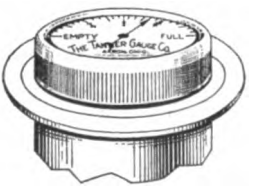

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BABBITT MELTING FURNACES (Continued)

DAVIS Machine Co., W. P., Rochester, N. Y. "Vesuvius."

ROCKWELL Co., W. S., New York, N. Y.

VESUVIUS—See Davis Machine Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

BRASS AND COPPER MELTING FURNACES

BARNETT Foundry Co., Oscar, Irvington, N. J.

BEST, W. N., New York, N. Y.

BRASS Founders Supply Co., Newark, N. J.

BYRAM & Co., Detroit, Mich.

CALUMET Foundry Equipment Co., Harvey, Ill.

CHICAGO Flexible Shaft Co., Chicago, Ill.

FISHER, Alfred, Chicago, Ill.

FOUNDRY Equipment Co., Buffalo, N. Y.

KROESCHELL Bros. Co., Chicago, Ill. "Kroeschell-Schwartz."

KROESCHELL-SCHWARTZ—See Kroeschell Bros. Co.

LITTLEFORD Bros., Cincinnati, O.

M. R. V.—See Wise, J. B.

MONARCH Engineering & Mfg. Co., Baltimore, Md. "Steele-Harvey."

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

ROCKWELL Co., W. S., New York, N. Y.

STEELE-HARVEY—See Monarch Engineering & Mfg. Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

WHITING Foundry Equipment Co., Harvey, Ill.

WISE, J. B., Watertown, N. Y. "M. R. V."

GASOLINE FURNACES

(See Torches, Gasoline)

SOLDERING FURNACES

(See also Torches, Gasoline)

DETROIT Heating & Lighting Co., Detroit, Mich.

GAUGES

CENTRE GAUGES

ATHOL Machine Co., Athol, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

STARRETT Co., L. S., Athol, Mass.

WYKE, J., Wilmington, Mass.

DEPTH GAUGES

BILLINGS & Spencer Co., Hartford, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

STARRETT Co., L. S., Athol, Mass.

DRILL AND WIRE GAUGES

BLODGETT Mfg. Co., Rochester, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 481.)

MORSE Twist Drill & Machine Co., New Bedford, Mass.

PECK, Stow & Wilcox Co., Southington, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

STARRETT Co., L. S., Athol, Mass.

LIMIT GAUGES

BROWN & Sharpe Mfg. Co., Providence, R. I.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant."

LITTLE GIANT—See Greenfield Tap & Die Co.

NICHOLS, W. H., Waltham, Mass.

PRATT & Whitney Co., Hartford, Conn (See page 457.)

ROGERS Works, John M., Gloucester City, N. J.

SLOAN & Chace Mfg. Co., Newark, N. J.

PLUG AND RING GAUGES

AMES & Co., B. C., Waltham, Mass.

ATLAS Ball Co., Philadelphia, Pa.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant."

GRONKVIST Drill Chuck Co., Jersey City, N. J. (Importers.) "Johansson."

JOHANSSON—See Gronkvist Drill Chuck Co.

LITTLE GIANT—See Greenfield Tap & Die Co.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NICHOLS, W. H., Waltham, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

ROGERS Works, John M., Gloucester City, N. J.

SLOAN & Chace Mfg. Co., Newark, N. J.

RING GAUGES

(See Gauges, Plug and Ring)

SCREW PITCH GAUGES

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BLODGETT Mfg. Co., Rochester, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

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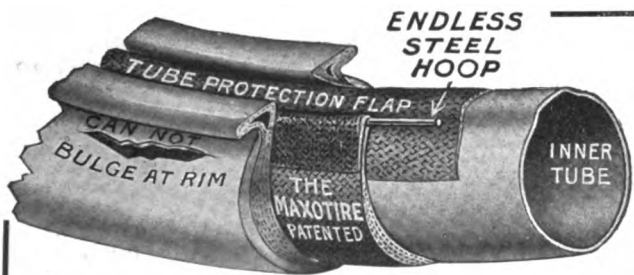

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GAUGES (Continued)

SCREW PITCH GAUGES (Continued)

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant."

LITTLE GIANT—See Greenfield Tap & Die Co.

NICHOLS, W. H., Waltham, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

REED & Prince Mfg. Co., Worcester, Mass.

STARRETT Co., L. S., Athol, Mass.

UNION Caliper Co., Orange, Mass.

SURFACE GAUGES

BILLINGS & Spencer Co., Hartford, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

REMINGTON Tool & Machine Co., Woburn, Mass.

STARRETT Co., L. S., Athol, Mass.

WYKE, J., Wilmington, Mass.

WIRE GAUGES

(See Gauges, Drill and Wire)

GOGGLES

MECHANICS AND WELDERS GOGGLES

ADAMS, William C., 332 Boylston St., Boston, Mass. (See page 495.)

CHICAGO Eye Shield Co., Chicago, Ill.

GLOBE Optical Co., Boston, Mass.

GUARDIAN—See Sussfeld, Lorsch & Co.

SUSSFELD, Lorsch & Co., New York, N. Y. "Guardian."

GRINDERS

CHUCKING GRINDERS

BRYANT Chucking Grinder Co., Springfield, Vt.

CRANK PIN GRINDERS

LANDIS Tool Co., Waynesboro, Pa. (See page 497.)

NORTON Grinding Co., Worcester, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

TINDEL-ALBRECHT—See Tindel-Morris Co.

TINDEL-MORRIS Co., Eddystone, Pa. "Tindel-Albrecht."

CUTTER GRINDERS

(See Grinders, Reamer and Cutter)

CYLINDER GRINDERS

BROWN & Sharpe Mfg. Co., Providence, R. I.

HEALD Machine Co., Worcester, Mass.

DISC GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BESLY & Co., Charles H., Chicago, Ill.

DIAMOND Machine Co., Providence, R. I.

GARDNER Machine Co., Beloit, Wis.

HOYSRADT & Case, Kingston, N. Y.

RANSOM Mfg. Co., Oshkosh, Wis.

ROWBOTTOM Machine Co., Waterbury, Conn.

TAYLOR & Fenn Co., Hartford, Conn.

VALLEY City Machine Works, Grand Rapids, Mich.

DRILL GRINDERS

HEALD Machine Co., Worcester, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NEW YANKEE—See Wilmarth & Morman Co.

SELLERS & Co., Wm., Philadelphia, Pa.

WASHBURN Shops, Worcester, Mass. "Worcester."

WILMARTH & Morman Co., Grand Rapids, Mich. "New Yankee."

WORCESTER—See Washburn Shops.

ELECTRIC PORTABLE GRINDERS

(See Drills, Electric Portable)

INTERNAL GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CONOVER-OVERKAMP Machine & Tool Co. Dayton, O.

HEALD Machine Co., Worcester, Mass.

LANDIS Tool Co., Waynesboro, Pa. (See page 497)

MODERN Tool Co., Erie, Pa.

RIVETT Lathe & Grinder Co., Boston, Mass.

THOMPSON Grinder Co., Springfield, O.

VAN NORMAN Machine Tool Co., Springfield, Mass.

PISTON RING GRINDERS

ALERT—See Harding, S. B.

BAY State Grinder Co., Worcester, Mass.

GARRIGUS Machine Co., C. G., Bristol, Conn.

HARDING, S. B., Waukesha, Wis. "Alert."

HEALD Machine Co., Worcester, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

WALKER Grinder Co., Worcester, Mass.

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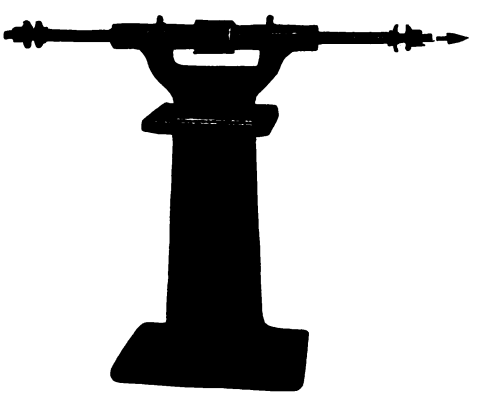

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PLAIN TOOL GRINDERS

ATHOL Machine Co., Athol, Mass.

BAIRD Machine Co., Bridgeport, Conn.

BATH Grinder Co., Fitchburg, Mass.

BLOUNT Co., J. G., Dept. A, Everett, Mass. (See page 495.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

BUILDERS Iron Foundry, Providence, R. I.

CANTON Foundry & Machine Co., Canton, O. (See page 473.)

CHALLENGE Machine Co., Philadelphia, Pa.

CHICAGO Machine Tool Co., Chicago, Ill.

CLIZBE Bros. Mfg. Co., Plymouth, Ind. "Crown."

CROWN—See Clizbe Bros. Mfg. Co.

DIAMOND Machine Co., Providence, R. I.

FITCHBURG Grinder Co., Fitchburg, Mass.

LA SALLE Machine & Tool Co., La Salle, Ill.

LANDIS Tool Co., Waynesboro, Pa. (See page 497.)

LUTHER Grinder Mfg. Co., Milwaukee, Wis.

MODERN Tool Co., Erie, Pa.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

NORTON Grinding Co., Worcester, Mass.

OESTERLEIN Machine Co., Cincinnati, O.

PARTRIDGE, E. O., Chicago, Ill.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

RANSOM Mfg. Co., Oshkosh, Wis.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

ST. LOUIS Machine Tool Co., St. Louis, Mo. "Western."

STAPF & Co., John B., Dunkirk, N. Y.

TABOR Mfg. Co., Philadelphia, Pa. "Taylor."

TAYLOR—See Tabor Mfg. Co.

VALLEY City Machine Works, Grand Rapids, Mich.

WALKER Grinder Co., Worcester, Mass.

WEBSTER & Perks Tool Co., Springfield, O.

WESTERN—See St. Louis Machine Tool Co.

REAMER AND CUTTER GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Milling Machine Co., Cincinnati, O.

CLOUGH, R. M., Tolland, Conn.

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

GREENFIELD Machine Co., Greenfield, Mass.

INGERSOLL Milling Machine Co., Rockford, Ill.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

NATIONAL Machine Co., Hartford, Conn.

OESTERLEIN Machine Co., Cincinnati, O.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

THOMPSON Grinder Co., Springfield, O.

WALKER Grinder Co., Worcester, Mass.

WELLS & Son Co., F. E., Greenfield, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich.

WOODS Engineering Co., Alliance, O.

SURFACE GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BAY State Grinder Co., Worcester, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

DIAMOND Machine Co., Providence, R. I.

GARRIGUS Machine Co., C. G., Bristol, Conn.

GARVIN Machine Co., New York, N. Y.

HEALD Machine Co., Worcester, Mass.

LA SALLE Machine & Tool Co., La Salle, Ill.

LANDIS Tool Co., Waynesboro, Pa. (See page 497.)

NATIONAL Machine Co., Hartford, Conn.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

ROWBOTTOM Machine Co., Waterbury, Conn.

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

THOMPSON Grinder Co., Springfield, O.

VALLEY City Machine Works, Grand Rapids, Mich.

WALKER Grinder Co., Worcester, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich.

SWING FRAME GRINDERS

PITTSBURG Emery Wheel Co., Pittsburg, Pa.

SAFETY Emery Wheel Co., Springfield, O.

TUCKER Machine Co., Cincinnati, O.

UNIVERSAL GRINDERS

AMERICAN Tool & Machine Co., Boston, Mass. (See page 515.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Grinder Co., Cincinnati, O.

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

LANDIS Tool Co., Waynesboro, Pa. (See page 497.)

MODERN Tool Co., Erie, Pa.

NORTON Grinding Co., Worcester, Mass.

THOMPSON Grinder Co., Springfield, O.

WILMARTH & Marmon Co., Grand Rapids, Mich.

WET TOOL GRINDERS

BLOUNT Co., J. G., Dept. A., Everett, Mass. (See page 495.)

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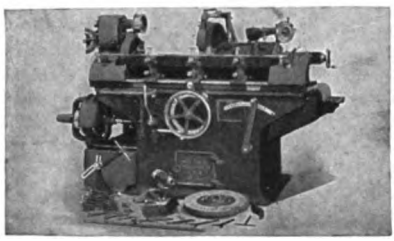
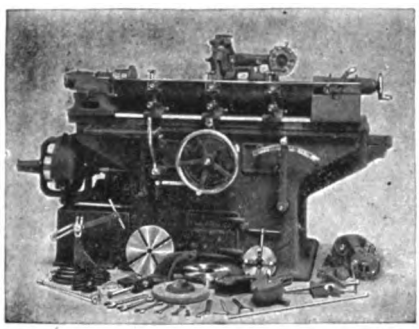


Landis Plain Grinder

Landis Plain Grinding Machines:—For line bearings of crank shafts—cam shaft bearings—valves (straight portion), push rods—pistons—piston rings—transmission shafts—axles, etc.

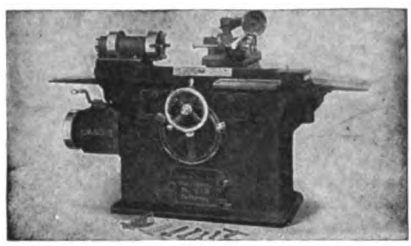
Landis Crank Grinder

Landis Crank Grinding Machine:—Capacity for single and multiple throw crank shafts with throws up to 8" single and 6" multiple.



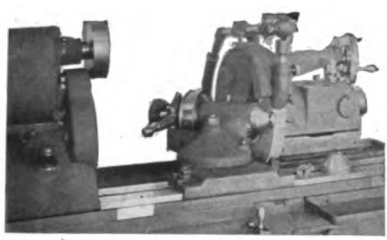
Landis Universal Grinder

Landis Universal Grinding Machines:—For valves (straight and taper portions), magnetos—piston rings (face grind), besides for tools—jigs, bushings, etc. This machine grinds—straight or taper internal or external—and is adapted for use with attachments such as magnetic chuck—valve seat grinding attachment—cam grinding attachment—cutter attachments, etc.

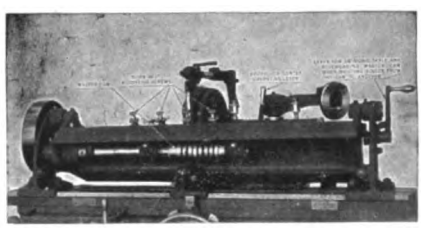


Landis Internal Grinder

Landis Internal Grinding Machine:—Transmission and differential gears—piston pin bushings—can be arranged for use with water—or with quick acting collet chuck.



Valve Seat Attachment:—For valve seats; also any other work of like nature. Graduated for swiveling to 90°.



Landis Cam Grinding Attachment

Landis Cam Grinding Attachments:—For use on Landis Universal and Plain grinding machines, both detachable and integral cam grinding attachments are each built in 3 sizes to suit our machines.

LANDIS TOOL COMPANY, Waynesboro, Pa.

New York Office, Fulton Building, 50 Church Street, Walter H. Foster Company, Managers

AGENTS: Dewstoe Machine Tool Co., Birmingham, Ala. Harron, Rickard & McCone, San Francisco and Los Angeles. C. W. Burton Griffiths & Co., London and Glasgow. Schuchardt & Schutte, Berlin, Stockholm, St. Petersburg, Copenhagen. Alfred H. Schutte, Cologne, Brussels, Liege, Milan, Paris, Barcelona and Bilbao. Donauwerk Ernst Krause & Co., Wien, Prag and Budapest. A. R. Williams Machinery Co., Toronto. Williams & Wilson, Montreal, Canada. Andrews & George, Yokohama, Japan.

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GRINDERS (Continued)

WET TOOL GRINDERS (Continued)

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

CHALLENGE Machine Co., Philadelphia, Pa.

CHICAGO Machine Tool Co., Chicago, Ill.

DIAMOND Machine Co., Providence, R. I.

GISHOLT Machine Co., Madison, Wis.

HOYSRADT & Case, Kingston, N. Y.

LELAND-GIFFORD Co., Worcester, Mass.

LUTTER & Gies Co., Milwaukee, Wis-. "Milwaukee."

MILWAUKEE—See Lutter & Gies.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

RANSOM Mfg. Co., Oshkosh, Wis.

SELLERS & Co., Wm., Philadelphia, Pa.

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

STERLING Grinding Wheel Co., Tiffin, O.

TAYLOR & Fenn Co., Hartford, Conn.

TUCKER Machine Co., Cincinnati, O.

VALLEY City Machine Works, Grand Rapids, Mich.

WEBSTER & Perks Tool Co., Springfield, O.

HAMMERS

BRASS AND COPPER HAMMERS

EUREKA Co., North East, Pa. (See page 255.)

GOODELL-PRATT Co., Greenfield, Mass.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn. (See page 201.)

HORAT, J., Dept. H., Lafayette, Ind. (See page 521.)

ROSE, J. A., Hastings, Neb.

UNION Hardware Co., Torrington, Conn.

WELCH Co., Thomas F., Boston, Mass.

CLAW HAMMERS

ATHA Tool Co., Newark, N. J.

CENTRAL Hardware Co., Philadelphia, Pa.

CHENEY Hammer Co., H., Little Falls, N. Y.

MAYDOLE Hammer Co., David, Norwich, N. Y.

VAN DOREN Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WARNER Hammer Co., Cromwell, Conn.

MACHINISTS HAMMERS

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

BUFFUM Tool Co., Louisiana, Mo.

CHENEY Hammer Co., H., Little Falls, N. Y.

DROP Forging Co. of New York, Jersey City, N. J. "Spartan."

EVANSVILLE Tool Works, Evansville, Ind.

HELLER Bros. Co., Newark, N. J.

HYDE Park Mfg. Co., Bernharts, Pa.

MAYDOLE Hammer Co., David., Norwich, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PERFECT HANDLE—See Smith & Co.

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SPARTAN—See Drop Forging Co. of New York.

VAN DOREN Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VLCHEK Tool Co., Cleveland, O.

WARNER Hammer Co., Cromwell, Conn.

PNEUMATIC HAMMERS

(See Tools, Pneumatic)

POWER HAMMERS

BEAUDRY & Co., Boston, Mass. "Champion," "Peerless."

BECHE—See Nazel Engineering & Machine Works.

BILLINGS & Spencer Co., Hartford, Conn.

BLISS Co., E. W., Brooklyn, N. Y.

BRADLEY & Son, C. C., Syracuse, N. Y.

CHAMPION—See Beaudry & Co.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CLEVELAND Machine Specialty Co., Cleveland, O.

DIENELT & Eisenhardt, Philadelphia, Pa.

JUSTICE & Co., P. S., Philadelphia, Pa.

LITTLE GIANT—See Mayer Bros. Co.

McLANE, J. B., North Reading, Mass.

MAC Gowan & Finigan Foundry & Machine Co., St. Louis, Mo. "Perfect."

MASSILLON Foundry & Machine Co., Massillon, O.

MAYER Bros. Co., Mankato, Minn. "Little Giant."

MERRILL Bros. Co., Maspeth, N. Y.

NAZEL Engineering & Machine Works, Philadelphia, Pa. "Beche."

NILES-BEMENT-POND Co., New York, N. Y.

PEERLESS—See Beaudry & Co.

PERFECT—See MacGowan & Finigan Foundry & Machine Co.

PETTINGELL Machine Co., Amesbury, Mass.

QUICKWORK—See Smith, H. Collier.

SCRANTON & Co., New Haven, Conn.

SMITH, H. Collier, Detroit, Mich. "Quickwork."

TOLEDO Machine & Tool Co., Toledo, O.

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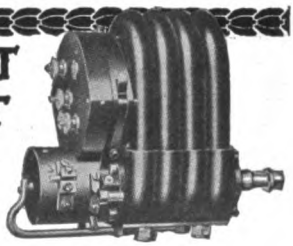

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Branch Offices, New York and Chicago
Sales Office: Detroit, Michigan

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HAMMERS (Continued)

POWER HAMMERS (Continued)

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WILLIAMS, White & Co., Moline, Ill.

STEAM HAMMERS

ALLIANCE Machine Co., Alliance, O.

BELL—See Buffalo Foundry & Machine Co.

BUFFALO Foundry & Machine Co., Buffalo, N. Y. "Bell."

CHAMBERSBURG Engineering Co., Chambersburg, Pa.

ERIE Foundry Co., Erie, Pa.

McDOUGALL & Potter Co., New York, N. Y.

MASSILLON Foundry & Machine Co., Massillon, O.

MORGAN Engineering Co., Alliance, O.

NILES-BEMENT-POND Co., New York, N. Y.

HANDLES

FILE AND TOOL HANDLES

AMERICAN File Sharpener Co., Brooklyn, N. Y.

BLISS Mfg. Co., R., Pawtucket, R. I.

CASSADY-FAIRBANK Mfg. Co., Chicago, Ill.

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

OHIO Tool Co., Charleston, W. Va.

OSGOOD, J. L., Buffalo, N. Y.

PIQUA Handle & Mfg. Co., Piqua, O.

SANDUSKY Tool Co., Sandusky, O.

TROY File Works, Troy, N. Y.

UNION Hardware Co., Torrington, Conn.

HEADS

BORING HEADS

MARVIN & Casler Co., Canastota, N. Y.

HEATERS

GLUE HEATERS

ADVANCE Machinery Co., Toledo, O. "Wetmore."

FRANCIS Co., Chas. E., Rushville, Ind.

WETMORE—See Advance Machinery Co.

SPECIAL GARAGE HEATERS

POSITIVE Tire Vulcanizer Co., Davenport, Ia.

SCIENTIFIC Heater Co., Cleveland, O.

HOLDERS

LATHE AND PLANER TOOL HOLDERS

ALMOND Mfg. Co., T. R., 1 Maple Ave., Ashburnham, Mass. (See page 427.)

AMERICAN Tool & Machine Co., Boston, Mass. (See page 515.)

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

BILLINGS & Spencer Co., Hartford, Conn.

BOWN Machine Co., Battle Creek, Mich.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CARR—See Thompson & Son Co.

CELFOR Tool Co., Buchanan, Mich.

CHAMPION—See Western Tool & Mfg. Co.

HANDY—See Morgan Mfg. Co.

MORGAN Mfg. Co., Newport, R. I. "Handy."

O. K. Tool Holder Co., Shelton, Conn.

READY Tool Co., Bridgeport, Conn. "Red-E."

RED-E—See Ready Tool Co.

THOMPSON & Son Co., Henry G., New Haven, Conn. "Carr."

TRIANGULAR Tool Co., Erie, Pa.

UNION Caliper Co., Orange, Mass.

VAN Doren Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

HORSES

HORSES, TRESTLES AND TRUCKS

BERKERT & Son, William, Pittsburg (N. S.), Pa.

FRASSE & Co., Peter A., New York, N. Y. "Hildreth." (See page 219.)

HILDRETH—See Frasse & Co.

JOHNSTOWN Automobile Co., Johnstown, Pa.

NELSON Mfg. Co., Chicago, Ill.

INDICATORS

SPEED INDICATORS

BRAUNSDORF-MUELLER Co., Elizabeth N. J.

BROWN Instrument Co., Philadelphia, Pa.

DISSTON & Sons, Henry, Philadelphia, Pa.

GRANT Mfg. & Machine Co., Bridgeport, Conn. "Tabor." (See page 517.)

McDONNELL Odometer Co., Chicago, Ill.

STARRETT Co., L. S., Athol, Mass.

TABOR—See Grant Mfg. & Machine Co.

VEEDER Mfg. Co., Hartford, Conn.

WOODMAN Mfg. & Supply Co., R., Boston, Mass.

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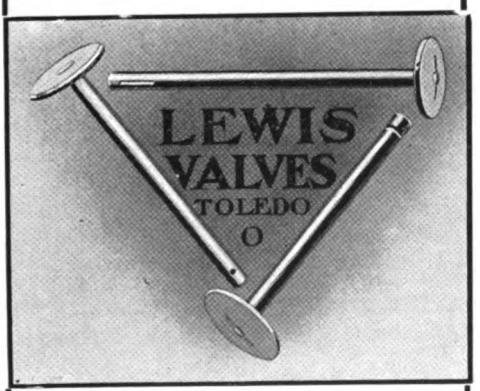

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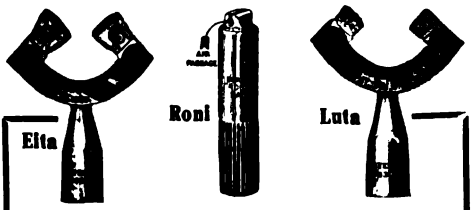

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NATIONAL Novelty Corp., New York, N. Y.

ROOTS Co., P. H. & F. M., Connersville, Ind.

SWETT Iron Works, A. L., Medina, N. Y.

JOINTERS

GLUE JOINTERS

BERLIN Machine Works, Beloit, Wis.

FALLS Machine Co., Sheboygan Falls, Wis.

FAY & Egan Co., Cincinnati, O.

LINDERMAN Machine Co., Muskegon, Mich.

KETTLES

SODA AND POTASH KETTLES

BROWN & Sharpe Mfg. Co., Providence, R. I.

CLEVELAND Machine Specialty Co., Cleveland, O.

GRAY & Prior Machine Co., Hartford, Conn.

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 390.)

MANUFACTURING, Equipment & Engineering Co., Boston, Mass.

MATHER & Warchter, Cleveland, O.

KEYS

MACHINE KEYS

PENNSYLVANIA Shafting Co., Spring City, Pa.

STANDARD Gauge Steel Co., Beaver Falls, Pa.
(See page 339.)

WHITNEY Mfg. Co., Hartford, Conn. "Woodruff."
(See page 115.)

WOODRUFF—See Whitney Mfg. Co.

KNURLS

KNURLING WHEELS

ALERT Tool Co., 221-23 N. 23d St., Philadelphia, Pa.
(See page 551.)

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill.
(See page 501.)

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

MILLER Tool Co., New Britain, Conn.

O. K. Tool Holder Co., Shelton, Conn.

PRATT & Whitney Co., Hartford, Conn.
(See page 457.)

WELCH Co., Thomas F., Boston, Mass.

LACQUERS

METAL LACQUERS

AMERICAN Lacquer Co., Bridgeport, Conn.

ARLINGTON Co., 725-27 Broadway, New York, N. Y.
(See page 259.)

BARRETT & Co., M. L., Chicago, Ill.

CELLULOID Zapon Co., New York, N. Y.

EGYPTIAN Lacquer Mfg. Co., New York, N. Y.

HANSON & Van Winkle Co., Newark, N. J.

KALBFLEISCH Co., Franklin H., Broadway & 16th St., New York, N. Y.
(See page 245.)

MAAS & Waldstein Co., New York, N. Y.

NIKOLAS & Co., G. J., Chicago, Ill.

ZINSSER & Co., W., New York, N. Y.

LATHES

BENCH OR PRECISION LATHES

AMERICAN Watch Tool Co., Waltham, Mass.

AMES & Co., B. C., Waltham, Mass.

ELGIN Tool Works, Elgin, Ill.

GOODELL-PRATT Co., Greenfield, Mass.

HARDINGE Bros., Chicago, Ill.

PRATT & Whitney Co., Hartford, Conn.
(See page 457.)

REMINGTON Tool & Machine Co., Woburn, Mass.

RIVETT Lathe & Grinder Co., Boston, Mass.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

SLOAN & Chace Mfg. Co., Newark, N. J.

SOUTH Bend Lathe Works, 600 E. Madison St., South Bend, Ind.
(See page 505.)

STARK Tool Co., Waltham, Mass.
(See page 503.)

TAYLOR & Fenn Co., Hartford, Conn.

VAN NORMAN Machine Tool Co., Springfield, Mass.

WALTHAM Machine Works, Waltham, Mass.

BUFFING LATHES

(See Machines, Buffing and Polishing)

CRANK PIN LATHES

AMERICAN Tool Works Co., Cincinnati, O.

BOGERT, John L., Flushing, N. Y.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

TINDELL-MORRIS Co., Eddystone, Pa.

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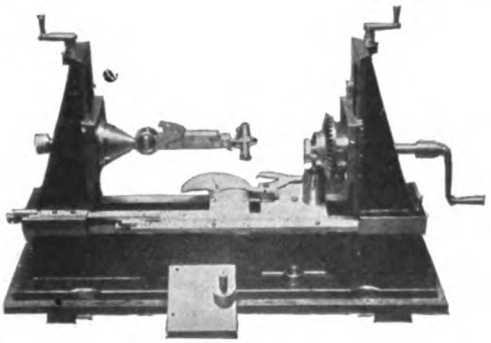

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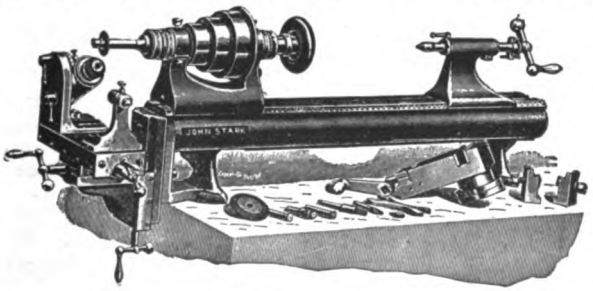

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BARKER & Co., Wm., Covington, Ky.

BARNES Co., W. F. & John, Rockford, Ill.

BARNES Drill Co., Rockford, Ill.

BOYE & Emmes Machine Tool Co., Cincinnati, O.

BRADFORD Machine Tool Co., Cincinnati, O.

CARROLL-JAMIESON Machine Tool Co., Batavia, O.

CHAMPION Tool Works Co., Cincinnati, O.

CINCINNATI Lathe & Tool Co., Cincinnati, O.

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

DAVIS Machine Co., W. P., Rochester, N. Y Mass. "Lo-Swing."

GREAVES-KLUSMAN Tool Co., Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HENDEY Machine Co., Torrington, Conn.

FAY Machine Tool Co., Philadelphia, Pa.

FITCHBURG Machine Works, Fitchburg, Mass.

FLATHER & Co., Nashua, N. H.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

LO-SWING—See Fitchburg Machine Works.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

MORRIS Machine Tool Co., John B., Cincinnati, O.

MUELLER Machine Tool Co., Cincinnati, O.

NEW Haven Mfg. Co., New Haven, Conn.

NILES-BEMENT-POND Co., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

PUTNAM Machine Co., Fitchburg, Mass.

RAHN-LARMON Co., Cincinnati, O.

REED-PRENTICE Co., Worcester, Mass.

ROBBINS Machine Co., Worcester, Mass.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

ROCKFORD Tool Co., Rockford, Ill.

SEBASTIAN Lathe Co., Cincinnati, O.

SENECA Falls Mfg. Co., Seneca Falls, N. Y. "Star."

SHEPARD Lathe Co., Cincinnati, O.

SOUTH Bend Lathe Works, 600 E. Madison St., South Bend, Ind. (See page 505.)

SPRINGFIELD Machine Tool Co., Springfield, O.

STAPF & Co., John B., Dunkirk, N. Y.

STAR—See Seneca Falls Mfg. Co.

VON Wyck Machine Tool Co., Cincinnati, O.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

WILLARD Machine & Tool Co., Cincinnati, O.

FORMING LATHES

MERIDEN Machine Tool Co., Meriden, Conn. "Yankee."

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

WARNER & Swasey Co., Cleveland, O.

YANKEE—See Meriden Machine Tool Co.

POLISHING LATHES

(See Machines, Buffing and Polishing)

PRECISION LATHES

(See Lathes, Bench or Precision)

TURRET LATHES

ACME Machine Tool Co., Cincinnati, O.

AMERICAN Tool Works Co., Cincinnati, O.

AMERICAN Tool & Machine Co., Boston, Mass. (See page 515.)

BARDONS & Oliver, Cleveland, O.

BOGERT, John L., Flushing, N. Y.

BOYE & Emmes Machine Tool Co., Cincinnati, O.

BRADFORD Machine Tool Co., Cincinnati, O.

BULLARD Machine Tool Co., Bridgeport, Conn.

DAVIS Machine Co., W. P., Rochester, N. Y.

DRESES Machine Tool Co., Cincinnati, O.

FAY & Scott, Dexter, Me.

FOSTER Machine Co., Elkhart, Ind.

GARVIN Machine Co., New York, N. Y.

GISHOLT Machine Co., Madison, Wis.

HAMILTON Machine Tool Co., Hamilton, O.

HARTNESS—See Jones & Lamson Machine Co.

INTERNATIONAL Machine Tool Co., Indianapolis, Ind. "Libby."

JONES & Lamson Machine Co., Springfield, Vt. "Hartness."

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

LIBBY—See International Machine Tool Co.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

MERIDEN Machine Tool Co., Meriden, Conn.

MODERN Machine Tool Co., Cincinnati, O.

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn. (See page 545.)

POTTER & Johnston Machine Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

RAHN-LARMON Co., Cincinnati, O.

REED-PRENTICE Co., Worcester, Mass.

SPRINGFIELD Machine Tool Co., Springfield, O.

STEINLE Turret Machine Co., Madison, Wis.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WARNER & Swasey Co., Cleveland, O.

WELLS & Son Co., F. E., Greenville, Mass.

WOOD Turret Machine Co., Brazil, Ind.

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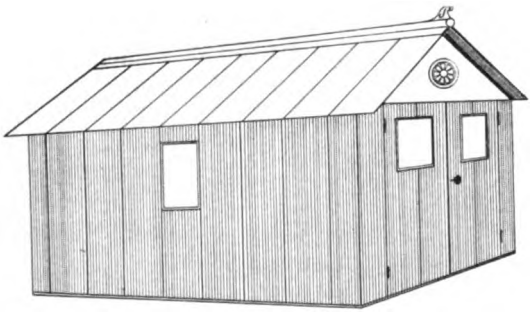
South Bend Lathe Works 600 E. Madison St. **South Bend, Ind.**



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Portable, Sectional, Galvanized Steel

EASILY SET UP **$100.00**

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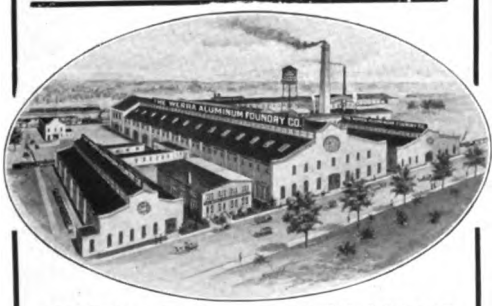

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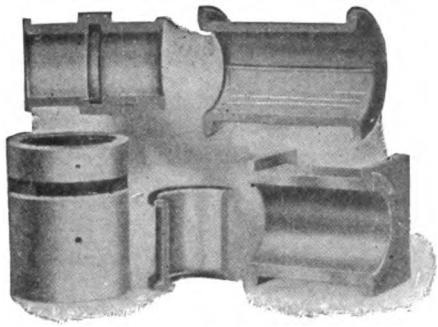

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Finished Parts Ready for Assembly Die Cast Bearings a Specialty

"American" Die Casting Co.

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Indianapolis, Ind.

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LATHES (Continued)

WOODWORKING LATHES

AMERICAN Saw Mill Machinery Co., New York, N. Y.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

CORDESMAN-RECHTIN Co., Cincinnati, O.

DEFIANCE Machine Works, Defiance, O.

FAY & Egan Co., J. A., Cincinnati, O.

FAY & Scott, Dexter, Me.

GREAVES-KLUSMAN Tool Co., Cincinnati, O.

OBER Mfg. Co., Chagrin Falls, O.

OLIVER Machinery Co., Grand Rapids, Mich.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

ROBBINS Machine Co., Worcester, Mass.

ROOT Co., B. M., York, Pa.

SMITH Machine Co., H. B., Smithville, N. J.

VALLEY City Machine Works, Grand Rapids, Mich.

LETTERS

PATTERN LETTERS

BENSKIN Mfg. Co., Canton, O. "Perfect."

BRIM, A. W., Seneca Falls, N. Y.

BUTLER, A. G., New York, N. Y.

CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

WELLMAN Pattern-Supply Co., Cleveland, O

LEVELS

SPIRIT LEVELS

ATHOL Machine Co., Athol, Mass.

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

COLUMBIA—See Smith, E. G.

COOK—See Gould & Jackson.

DISSTON & Sons, Henry, Philadelphia, Pa.

GOODELL-PRATT Co., Greenfield, Mass.

GOULD & Jackson, Watertown, N. Y. "Cook."

SMITH, E. G., Columbia, Pa. "Columbia."

STANLEY Rule & Level Co., New Britain, Conn.

STARRETT Co., L. S., Athol, Mass.

LOCKERS

METAL CLOTHES LOCKERS

BUFFALO Wire Works Co., Buffalo, N. Y.

CARPENTER-McWATTERS Co., Cleveland, O.

CLARK Co., W. J., Salem, O.

DARBY & Sons Co., Edward, Philadelphia, Pa.

DURAND-STEEL Locker Co., Chicago, Ill.

FEDERAL Steel Fixture Co., Chicago, Ill.

HART & Hutchinson Co., New Britain, Conn.

HETTS Co., Detroit, Mich.

JEFFERIS Co., R. W., Camden, N. J.

LYON Metallic Mfg. Co., Aurora, Ill.

MANUFACTURING, Equipment & Engineering Co., Boston, Mass.

MERRITT & Co., Camden, N. J.

SMITH Wire & Iron Works, F. P., Chicago, Ill.

TERRELL'S Equipment Co., Grand Rapids, Mich.

VAN Dorn Iron Works, Cleveland, O.

LUBRICANTS

CUTTING LUBRICANTS

ACME—See Cataract Refining & Mfg. Co.

AJAX—See Phoenix Oil Co.

CASCADE—See Cataract Refining & Mfg. Co.

CATARACT Refining & Mfg. Co., Buffalo, N. Y. "Mystic," "Acme," "Cascade."

CUT-RITE—See Phoenix Oil Co.

FAULTLESS—See Hawkeye Oil Co.

FOOTE, Pierson & Co., New York, N. Y. "Lubria."

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HAWS, Geo. A., 142-44 Front St., New York, N. Y.
(See page 273.)

HOUGHTON & Co., E. F., Philadelphia, Pa.

L-O—See Richards, G. Whitfield.

LUBE-WELL—See Richards, G. Whitfield.

LUBRI-KOOL—See Richards, G. Whitfield.

LUBRIA—See Foote, Pierson & Co.

MYSTIC—See Cataract Refining & Mfg. Co.

NAGLENE—See Ulco Oil Co.

PHOENIX Oil Co., Cleveland, O. "Ajax," "Cut-rite."

RICHARDS, G. Whitfield, Philadelphia, Pa. "Lube-Well," "L-O," "Lubri-Kool."

ULCO Oil Co., Detroit, Mich. "Naglene."

MACHINERY

DEALERS IN MACHINERY

(This is a list of Dealers in Machinery who advertise in this Publication)

FRASSE & Co., Peter A., New York, N. Y.
(See page 219.)

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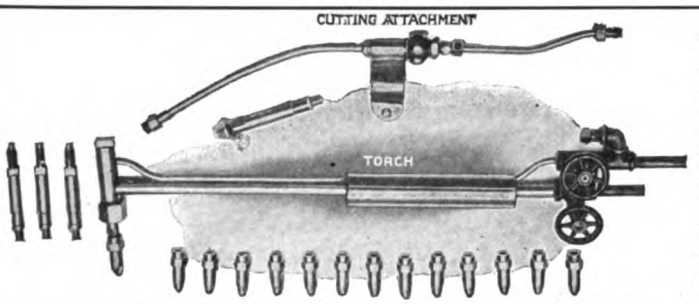

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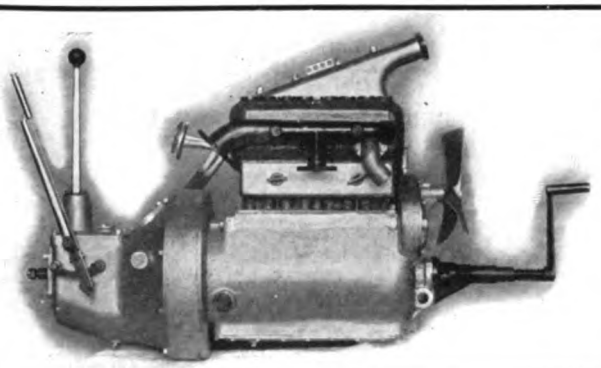
Manufacturers are astonished at the many uses to which the VULCAN WELDING & BRAZING machines can be put. Some of the biggest manufacturers in this country such as Brill Car Works use our machines and find them surprisingly satisfactory.

For garages we have a special outfit at a low price which cleans the carbon out of any cylinder in 10 minutes. At $1.00 per cylinder their revenues are in some cases $100.00 a month. If you want a real money-making necessity in your garage, let us tell you about our device.

The Vulcan Brazing & Machine Co.
310-312 N. 16th Street, Philadelphia, Pa.



Latest development in
Motors & Unit Power Plants
designed and adaptable for
Small Cars and Cycle Cars

4 cylinder ("en bloc") water cooled, long stroke type magneto or other ignition.
Crank and transmission case aluminum—sliding gear transmission; 3 speeds forward and reverse (arranged for right hand or centre control).
Power plants furnished complete with control levers, clutch, pedals and starting crank (as per cut).
Immediate delivery in largest quantities, factory capacity almost unlimited.

Selling Representatives
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Stamping and Drawing

Seamless Tube
BRASS AND COPPER
SMALL SIZES A SPECIALTY

Screw Machine Work

Arthur T. Rutter & Co.
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New York

GEARS

COMPLETE AUTOMOBILE TRANSMISSIONS *AND* DIFFERENTIALS

BROWN-LIPE-CHAPIN GEAR Co
SYRACUSE N.Y.
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MACHINERY (Continued)

DEALERS IN MACHINERY (Continued)

HARRIS Bros. Co., Detroit, Mich. (See page 485.)

MONTGOMERY & Co., 105-07 Fulton St., New York, N. Y. (See page 551.)

SAND MIXING AND CONVEYING MACHINERY

BARBOUR-STOCKWELL Co., Cambridgeport, Mass.

PANGBORN Corp., Hagerstown, Md.

STANDARD Sand & Machine Co., Cleveland, O.

MACHINES

ABRASIVE METAL CUTTING MACHINES

SLACK Mfg. Co., Springfield, Vt.

AUTOGENOUS WELDING MACHINES

ADMIRAL Welding Machine Co., Kansas City, Mo.

ASHTON, Laird & Co., New York, N. Y. "Astra."

ASTRA—See Ashton, Laird & Co.

BUCKEYE—See Macleod Co.

COX Brass Mfg. Co., Albany, N. Y. (See page 511.)

DAVIS-BOURNONVILLE Co., Jersey City, N. J.

DELCAMPE Welding Co., Bridgeport, Conn.

DYER Apparatus Co., 155 Brookline St., Cambridge, Mass. (See page 511.)

ECONOMY Welding Machine Co., Kansas City, Mo.

ELLINGER Mfg. Co., Walter, Sheboygan, Wis.

ENGINEERING Sales Corp., Chicago, Ill.

GENERAL Welding Co., Hoboken, N. J.

GOODYEAR, Nelson, New York, N. Y.

HAVENS Bros. Mfg. Co., Denver, Colo.

HEITHECKER, A., 18 Dunham Pl., Brooklyn, N. Y. (See page 509.)

HENDERSON-WILLIS Welding & Cutting Co., St. Louis, Mo.

JAHNKE Welding & Supply Co., San Francisco, Cal.

MACLEOD Co., Walter, Cincinnati, O. "Buckeye."

MESSER & Co., Philadelphia, Pa.

METAL Welding & Supply Co., Denver, Colo.

METALS Welding Co., Cleveland, O.

MILBURN Co., Alexander, Baltimore, Md.

MONARCH Mfg. Co., Dayton, O.

NORTHERN Welding Co., Minneapolis, Minn. "Vulcan."

OXWELD Acetylene Co., Chicago, Ill.

OXY-CARBI Co., New Haven, Conn.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind. (See page 509.)

RICE & Dayton Mfg. Co., Cedar Falls, Ia.

RUSS—See Stewart Auto Accessories Co.

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SCHAAP Automobile Co., Brooklyn, N. Y.

STEWART Auto Accessories Co., Chicago, Ill. "Russ."

TOLMAN Mfg. Co., 19-21 W. Third St., Boston, Mass. (See page 511.)

TURNER Brass Works, Sycamore, Ill.

U. O. C.—See Union Oxy-Carbide Co.

UNION Oxy-Carbide Co., Brooklyn, N. Y. "U. O. C."

VULCAN—See Northern Welding Co.

VULCAN Brazing & Machine Co., 310-12 N. 16th St., Philadelphia, Pa. (See page 507.)

WATERHOUSE Welding Co., Boston, Mass.

WELDRITE Co., Long Island City, N. Y.

WESTERN Welding & Mfg. Co., Chicago, Ill.

BLUE PRINTING MACHINES

BLUE Streak—See Revolute Machine Co.

BUCKEYE Engine Co., Salem, O.

KEUFFEL & Esser Co., Hoboken, N. J.

PEASE Co., C. F., Chicago, Ill.

REVOLUTE Machine Co., New York, N. Y. "Blue Streak."

BOLT HEADING MACHINES

ACME Machinery Co., Cleveland, O.

AJAX Mfg. Co., Cleveland, O.

BROWN Co., H. B., East Hampton, Conn. "Davis."

BURDICT—See Howard Iron Works.

COOK Co., Asa S., Hartford, Conn.

DAVIS—See Brown Co.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

NATIONAL Machinery Co., Tiffin, O.

NEW Doty Mfg. Co., Jamesville, Wis.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

BOLT POINTING MACHINES

ACME Machinery Co., Cleveland, O.

BROWN Co., H. B., East Hampton, Conn. "Merriman."

BURDICT—See Howard Iron Works.

Complete Index to Classification appears on Pages 8 to 26.

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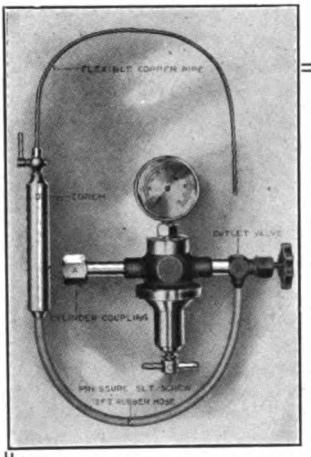
For Garages and Service Stations



One of the commonest jobs you are called upon to handle is removing carbon from cylinders. It is mean, nasty, unprofitable work, unless you have the device here illustrated. Thousands of them have been sold throughout the United States because they save time and labor and make cylinder cleaning profitable. The outfit is exactly as illustrated and is used with an oxygen tank, which you don't have to buy, but each filling of which, while it costs you $2, will enable you to do from $20 to $30 worth of work with my Carbon Remover.

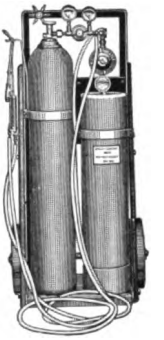
I also make outfits for welding purposes and carbonic acid gas reducing valves.

Prices and information upon request.

A. HEITHECKER, 18 Dunham Place, Brooklyn, N. Y.

Prest-O-Welder

A convenient, portable, economical outfit for oxy-acetylene welding and cutting, and for



Removing Carbon with Oxygen

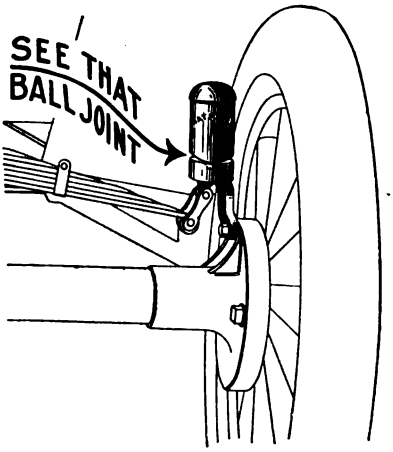
Write for details of our Service Plan on welding gas.

Prest-O-Torch (acetylene), the most convenient, efficient blow torch for soldering and brazing.

Prest-O-Liter lights, dims and extinguishes gas lamps from the dash.

The Prest-O-Lite Co., Inc.

1400 Speedway **Indianapolis**



Why not purchase a Shock Absorber that is made right, on the start?

We screw all our caps on, and then use a set screw, National's are guaranteed not to rattle, as others do.

We are looking for great big business, Jobbers only. A card will bring you our Jobbers proposition. Write today.

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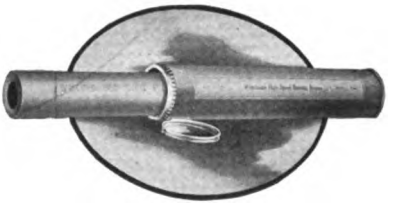
GRAND RAPIDS, MICH.

Whitehouse High Speed Bearing Bronze



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MACHINES (Continued)

BOLT POINTING MACHINES (Continued)

COOK Co., Asa S., Hartford, Conn.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

LANDIS Machine Co., Waynesboro, Pa.

MERRIMAN—See Brown Co.

NATIONAL Machinery Co., Tiffin, O.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

WEBSTER & Perks Tool Co., Springfield, O.

BOLT THREADING MACHINES

ACME Machinery Co., Cleveland, O.

BROWN Co., H. B., East Hampton, Conn. "Merriman."

BURDICT—See Howard Iron Works.

COOK Co., Asa S., Hartford, Conn.

FOOTE-BURT Co., Cleveland, O. "Reliance."

GREEN RIVER—See Greenfield Tap & Die Co.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant," "Green River."

HERCULES—See Wells & Son Co.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

LANDIS Machine Co., Waynesboro, Pa.

LITTLE GIANT—See Greenfield Tap & Die Co.

MERRIMAN—See Brown Co.

NATIONAL Machinery Co., Tiffin, O.

NILES-BEMENT-POND Co., New York, N.Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

RELIANCE—See Foote-Burt Co.

WEBSTER & Perks Tool Co., Springfield, O.

WELLS & Son Co., F. E., Greenfield, Mass. "Hercules."

BORING MACHINES

(Horizontal)

BEAMAN & Smith Co., Providence, R. I.

BINSSE Machine Co., Harrison, N. J.

ESPEN-LUCAS Machine Works, Philadelphia, Pa.

GISHOLT Machine Co., Madison, Wis.

LUCAS Machine Tool Co., Cleveland, O.

NILES-BEMENT-POND Co., New York, N. Y.

UNIVERSAL Boring Machine Co., Hudson, Mass.

BORING MACHINES

(Vertical)

BAKER Bros., Toledo, O.

BEAMAN & SMITH Co., Providence, R. I.

BULLARD Machine Tool Co., Bridgeport, Conn.

CINCINNATI Planer Co., Cincinnati, O.

COLBURN Machine Tool Co., Franklin, Pa.

FOOTE-BURT Co., Cleveland, O.

HOEFER Mfg. Co., Freeport, Ill.

KING Machine Tool Co., Cincinnati, O.

MOLINE Tool Co., Moline, Ill.

NILES-BEMENT-POND Co., New York, N. Y.

BUFFING AND POLISHING MACHINES

BENNETT-O'CONNELL Co., Chicago, Ill.

BLOUNT Co., J. G., Dept. A, Everett, Mass. (See page 495.)

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

BUILDERS Iron Foundry, Providence, R. I.

CHALLENGE Machine Co., Philadelphia, Pa.

DIAMOND Machine Co., Providence, R. I.

GARDNER Machine Co., Beloit, Wis.

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn. (See page 545.)

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

RANSOM Mfg. Co., Oshkosh, Wis.

ST. LOUIS Machine Tool Co., St. Louis, Mo. "Western."

SIBLEY-HOUFLEY Machine Co., Detroit, Mich. "Garland."

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

VALLEY City Machine Works, Grand Rapids, Mich.

WEBSTER & Perks Tool Co., Springfield, O.

WESTERN—See St. Louis Machine Tool Co.

CAM CUTTING MACHINES

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

STANDARD Machinery Co., Auburn, R. I. (See page 431.)

CORE MAKING MACHINES

BROWN Specialty Machinery Co., Chicago, Ill. "Hammer."

DIAMOND Clamp & Flask Co., Richmond, Ind.

HAMMER—See Brown Specialty Machinery Co.

CORE WIRE STRAIGHTENING AND CUTTING MACHINES

BLAKE Mfg. Co., Geo. F., New York, N. Y. "Climax."

CLIMAX—See Blake Mfg. Co.

GREGG Mfg. Co., Cleveland, O.

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STRAIGHTENING, SOLDERING
REMOVING CARBON

OUTFIT ASSEMBLED TO PRESTO AND
100ft. OXYGEN TANK
Tanks Not Included
We sell everything for WELDING
The DYER APPARATUS COMPANY
155 Brookline St., Cambridge, Mass.

A New
and Wonderful
WELDING
APPARATUS

Saves 15 per cent. in Time
and Gas.
No More Flash-back.
No More Loss of Time.
No More Cooled off Metal.

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Outfit

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19 & 21 West 3d St.
BOSTON, MASS.

COX COMBINATION WELDING
AND DECARBONIZER OUTFIT

Do Your Own Welding

Save time and money on repair jobs. Every garage and every owner of taxicabs and motor trucks has an *actual and frequent need* for a good, simple, welding outfit. Don't send out such repair work. You can now *do it yourself*—and save a lot of time for your customers and money for yourself!

Don't buy and wait for new parts! You can *make old parts as good as new* by using the Cox Welding Outfit. Complete in every detail. Will do every possible welding job. Unlike others, it is *very simple in construction*. Any average mechanic can become adept in its use in a short time. We furnish complete instructions with each outfit. Can be used on parts of iron, steel, brass, bronze and aluminum. It is *safe* and *sure*. Every job you do means *extra profit for you*. The outfit will pay for itself many times over. It means quick repair work—and *all of it done in your shop!*

The Cox Outfit is not only excellent for welding, but it can also be used to quickly and completely remove carbon from cylinders. Thus you have a dual outfit—a profit maker two ways! Its use is doubled. It saves time in two ways—and produces two profits! Its possession indicates progressiveness—up to date in shop equipment.

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MACHINES (Continued)

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PECK, Stow & Wilcox Co., Southington, Conn.

PETTINGELL Machine Co., Amesbury, Mass.

STOLL Co., D. H., Buffalo, N. Y.

CUTTING-OFF MACHINES

BROWN & Sharpe Mfg. Co., Providence, R. I.

DAVIS Machine Co., W. P., Rochester, N. Y.

HURLBURT-ROGERS Machine Co., South Sudbury, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

DRILLING MACHINES

(See Drills)

ELECTRIC WELDING MACHINES

AGNEW Electric Welder Co., Detroit, Mich.

C. & C. Electric & Mfg. Co., Garwood, N. J.

GEUDER, Paeschke & Frey Co., Milwaukee, Wis.

NATIONAL Electric Welder Co., Warren, O. (See page 501.)

THOMSON Electric Welding Co., Lynn, Mass.

TOLEDO Electric Welder Co., Cincinnati, O.

UNIVERSAL Electric Welding Co., New York, N. Y.

WINFIELD Electric Welding Machine Co., Warren, O.

FILING MACHINES

AMES & Co., B. C., Waltham, Mass.

COCHRANE-BLY Co., Rochester, N. Y.

HARTFORD—See Robinson Tool Works.

ROBINSON Tool Works, Waterbury, Conn. "Hartford."

GEAR CUTTING MACHINES

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Gear Cutting Machine Co., Cincinnati, O.

FELLOWS Gear Shaper Co., Springfield, Vt.

FLATHER Mfg. Co., E. J., Nashua, N. H.

GARVIN Machine Co., New York, N. Y.

GLEASON Works, Rochester, N. Y.

GOULD & Eberhardt, Newark, N. J.

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O. (See page 189.)

LEES-BRADNER Co., Cleveland, O.

NEWARK Gear Cutting Machine Co., Newark, N. J.

SCHUCHARDT & Schutte, New York, N. Y. (Importers.)

SLOAN & Chace Mfg. Co., Newark, N. J.

STANDARD Mfg. Co., Bridgeport, Conn.

WHITON Machine Co., D. E., New London, Conn.

GEAR HOBBING MACHINES

ADAMS Co., Dubuque, Ia.

BARBER-COLMAN Co., Rockford, Ill.

GOULD & Eberhardt, Newark, N. J.

LEES-BRADNER Co., Cleveland, O.

MEISSELBACH-CATUCCI Mfg. Co., Newark, N. J.

NEWARK Gear Cutting Machine Co., Newark, N. J.

REYNOLDS Pattern & Machine Co., Moline, Ill.

SCHUCHARDT & Schutte, New York, N. Y. (Importers.)

GEAR TOOTH CHAMFERING MACHINES

INGLE Corp., Rochester, N. Y.

SCHUCHARDT & Schutte, New York, N. Y. (Importers.)

HAIR PICKING MACHINES

LOUNSBERY & Sons, G. H., Cincinnati, O.

PRIZE—See Willcomb Co.

WILLCOMB Co., Geo., Boston, Mass. "Prize."

KEY SEATING MACHINES

BAKER Bros., Toledo, O. "Colburn."

BURR & Sons, John T., Brooklyn, N. Y.

COLBURN—See Baker Bros.

DAVIS Machine Co., W. P., Rochester, N. Y.

GIANT—See Mitts & Merrill.

LAPOINTE Machine Tool Co., Hudson, Mass.

MITTS & Merrill, Saginaw, Mich. "Giant."

NATIONAL Machine Tool Co., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

LEATHER MEASURING MACHINES

NIGHTINGALE, J. E., Danvers, Mass.

TUFTING Machine Supply Co., Detroit, Mich.

TURNER Tanning Machinery Co., Peabody, Mass.

LEATHER SPLITTING MACHINES

AMERICAN Tool & Machine Co., Boston, Mass. (See page 515.)

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MACHINES (Continued)

MARKING MACHINES

GORTON Machine Co., George, Racine, Wis.

MILLING MACHINES

ADAMS Co., Dubuque, Ia.

BEAMAN & Smith Co., Providence, R. I.

BECKER Milling Machine Co., Hyde Park, Mass.

BRIGGS—See Gooley & Edlund.

BROWN & Sharpe Mfg. Co., Providence, R. I.

BURKE Machine Tool Co., Conneaut, O.

CARTER & Hakes Co., Winsted, Conn.

CHICAGO Machine Tool Co., Chicago, Ill.

CINCINNATI Milling Machine Co., Cincinnati, O.

FOSDICK Machine Tool Co., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GARVIN Machine Co., New York, N. Y.

GOOLEY & Edlund, Syracuse, N. Y. "Briggs."

HENDEY Machine Co., Torrington, Conn.

INGERSOLL Milling Machine Co., Rockford, Ill.

KEARNEY & Trecker Co., Milwaukee, Wis. "Milwaukee."

KEMPSMITH Mfg. Co., Milwaukee, Wis.

KNIGHT Machinery Co., W. B., St. Louis, Mo.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

MILWAUKEE—See Kearney & Trecker Co.

OESTERLEIN Machine Co., Cincinnati, O. "Ohio."

OHIO—See Oesterlein Machine Co.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

ROCKFORD Machine Tool Co., Rockford, Ill.

ROCKFORD Milling Machine Co., Rockford, Ill.

SLOAN & CHACE Mfg. Co., Newark, N. J.

STEPTOE Shaper Co., John, Cincinnati, O.

THURSTON Mfg. Co., Providence, R. I.

VALLEY City Machine Works, Grand Rapids, Mich.

VAN NORMAN Machine Tool Co., Springfield, Mass.

WHITNEY Mfg. Co., Hartford Conn. (See page 115.)

MOTOR DECARBONIZING MACHINES

(See also Compounds, Carbon; also Removers, Carbon)

ASHTON, Laird & Co., New York, N. Y. "Astra."

ASTRA—See Ashton, Laird & Co.

AUTO Gas Light Co., Hazelton, Pa. "M-E."

BROWN Co., Syracuse, N. Y.

CHAMPION—See Cleveland Faucet Co.

CLEVELAND Faucet Co., Cleveland, O. "Champion."

COX Brass Mfg. Co., Albany, N. Y. (See page 511.)

DYER Apparatus Co., 155 Brookline St., Cambridge, Mass. (See page 511.)

FERRIER Mfg. Co., G. F., Pittsburg, Pa.

GENERAL Welding Co., Hoboken, N. J.

HEITHECKER, A., 18 Dunham Pl., Brooklyn, N. Y. (See page 509.)

HILT Co., R., Boston, Mass.

KARBO-KLEANER Co., Buffalo, N. Y.

M-E—See Auto Gas Light Co.

MESSER & Co., Philadelphia, Pa.

NORFOLK—See Tolman Mfg. Co.

OXWELD Acetylene Co., Chicago, Ill.

OXY-DECARBONIZER Co., Boston, Mass.

OXYGEN Decarbonizer Co., Albion, Mich.

OXYGEN Generator Co., Troy, N. Y.

OZO Co., Boston, Mass.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind. (See page 509.)

PROGRESSIVE Mfg. Co., Reading, Pa.

RICE & Dayton Mfg. Co., Cedar Falls, Ia.

TOLMAN Mfg. Co., 19-21 W. Third St., Boston, Mass. "Norfolk." (See page 511.)

U. O. C.—See Union Oxy-Carbide Co.

UNION Oxy-Carbide Co., Brooklyn, N. Y. "U. O. C."

VULCAN Brazing & Machine Co., 310-12 N. 16th St., Philadelphia, Pa. (See page 507.)

VULITE Chemical Co., Boston, Mass.

NUT TAPPING MACHINES

ACME Machinery Co., Cleveland, O.

AUTOMATIC Machine Co., Bridgeport, Conn.

BROWN Co., H. B., East Hampton, Conn.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant."

HOWARD Iron Works, Buffalo, N. Y. "Schlenker."

LANDIS Machine Co., Waynesboro, Pa.

LITTLE GIANT—See Greenfield Tap & Die Co.

NATIONAL Machinery Co., Tiffin, O.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

REED Co., Francis, Worcester, Mass.

SCHLENKER—See Howard Iron Works.

WEBSTER & Perks Tool Co., Springfield, O.

WELLS & Son Co., F. E., Greenfield, Mass.

PISTON RING MACHINES

(Semi-Automatic)

GRIDLEY—See Windsor Machine Co.

WINDSOR Machine Co., Windsor, Vt. "Gridley."

Complete Index to Classification appears on Pages 8 to 26.

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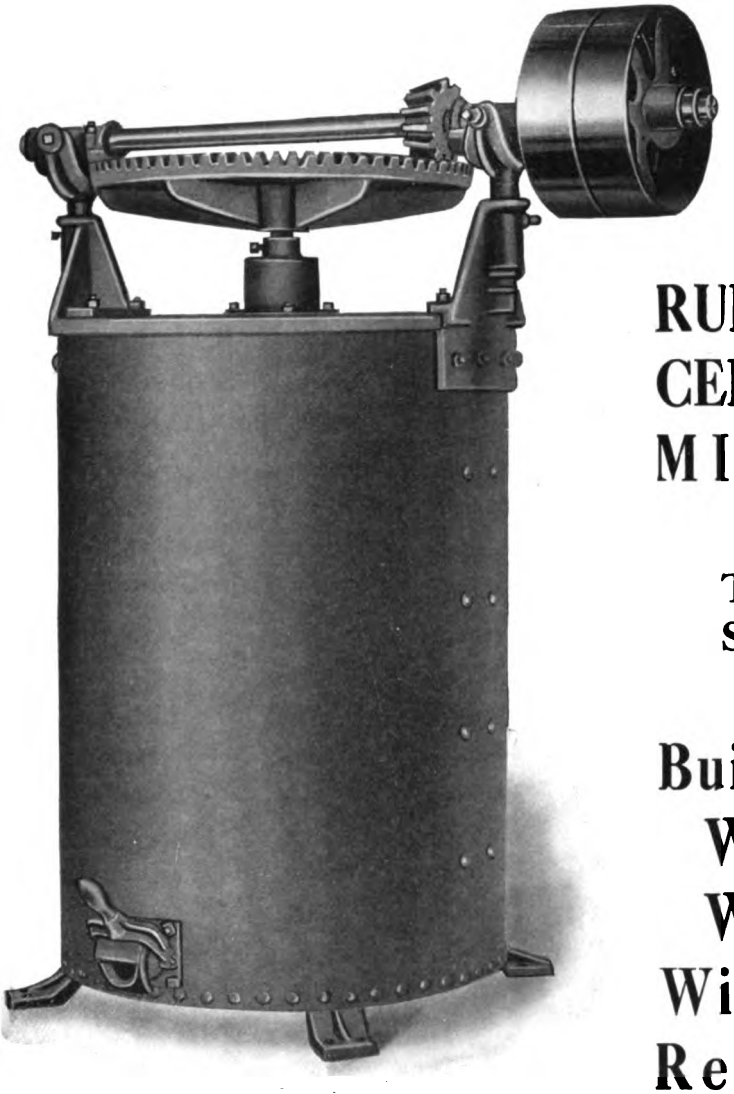

75 GALLONS TO 200 GALLONS

RUBBER CEMENT MIXER

Two Sizes

Built to Wear Well Without Repairs

The American Tool & Machine Co.

Incorporated 1864 Boston

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MACHINES (Continued)

POLISHING MACHINES

(See Machines, Buffing and Polishing)

PROFILING MACHINES

BECKER Milling Machine Co., Hyde Park, Mass.

GARVIN Machine Co., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

RIVETING MACHINES

CINCINNATI Pulley Machinery Co., Cincinnati, O.

EVELAND Engineering & Mfg. Co., Philadelphia, Pa.

GRANT Mfg. & Machine Co., Bridgeport Conn. (See page 517.)

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

SHUSTER Co., F. B., New Haven, Conn.

TOWNSEND Mfg. Co., H. P., Hartford, Conn.

SAND BLAST MACHINES

AMERICAN Diamond Blast Co., New York, N. Y.

BETTON, J. M., New York, N. Y. "Drucklieb."

BUCKEYE—See Macleod Co.

CARTER Metals Cleaning Co., Philadelphia, Pa. "Evans."

CURTIS & Co., Mfg. Co., St. Louis, Mo.

DANIC—See Nichols Iron Works.

DE LA VERGNE Machine Co., New York, N. Y.

DRUCKLIEB—See Betton, J. M.

EVANS—See Carter Metals Cleaning Co.

MACLEOD Co., Walter, Cincinnati, O. "Buckeye."

NIAGARA Devices, Buffalo, N. Y.

NICHOLS Iron Works, D. M., New York, N. Y. "Danic."

PANGBORN Corp., Hagerstown, Md.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. "Paxson-Warren." (See page 517.)

PAXSON-WARREN—See Paxson Co.

SLY Mfg. Co., W. W., Cleveland, O.

TILGHMAN-BROOKSAND Sand Blast Co., Philadelphia, Pa.

SAW SHARPENING MACHINES

COCHRANE-BLY Co., Rochester, N. Y.

HUNTER Saw & Machine Co., Pittsburg, Pa.

NUTTER & Barnes Co., Hinsdale, N. H.

SCREW MACHINES

(Automatic)

AUTOMATIC Machine Co., Bridgeport, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CHICAGO Automatic Machine Co., Chicago, Ill.

CLEVELAND Automatic Machine Co., Cleveland, O.

DAVIS Sewing Machine Co., Dayton, O. "Lester."

DAVENPORT Machine Tool Co., New Bedford, Mass.

FOSTER Machine Co., Elkhart, Ind.

GRIDLEY—See Windsor Machine Co.

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn. (See page 297.)

LESTER—See Davis Sewing Machine Co.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 269.)

PEERLESS Automatic Machine Co., Cleveland, O.

POTTER & Johnston Machine Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

TOWNSEND Mfg. Co., H. P., Hartford, Conn.

WINDSOR Machine Co., Windsor, Vt. "Gridley."

SCREW MACHINES

(Hand)

ACME Machine Tool Co., Cincinnati, O.

BARDONS & Oliver, Cleveland, O.

DRESES Machine Tool Co., Cincinnati, O.

FOSTER Machine Co., Elkhart, Ind.

GARVIN Machine Co., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

WARNER & Swasey Co., Cleveland, O.

SPRING COILING MACHINES

COULTER & McKenzie Machine Co., Bridgeport, Conn.

GARVIN Machine Co., New York, N. Y.

HOEFER—See Wells Co.

WELLS Co., Frank L., Kenosha, Wis "Hoefer."

SPRING TESTING MACHINES

COULTER & McKenzie Machine Co., Bridgeport, Conn.

TAPPING MACHINES

BAKER Bros., Toledo, O.

GARVIN Machine Co., New York, N. Y.

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn. (See page 297.)

NATIONAL Machine Co., Hartford, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

ST. LOUIS Machine Tool Co., St. Louis, Mo.

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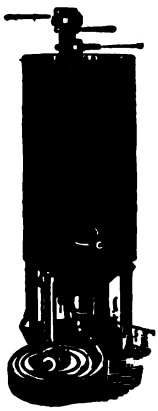
THE PAXSON-SAWYER MAGNETIC SEPARATOR

will separate iron and brass chips thoroughly. The magnets have been redesigned and by the use of the best Tungsten magnet steel the magnets are made practically permanent and at least three times as strong as formerly. The separator, for work within its capacity, is equal in efficiency to those having electro magnets.

Write for circular and additional information and prices. We can also furnish new magnets, brushes and other spare parts for old machines.



PAXSON-WARREN SAND BLAST MACHINERY

is most advantageously used for cleaning forgings, castings and hardened steel gears and other parts that are used in automobile construction. All machines are tested to 100 lbs. pressure. For the general run of work, however, 20 to 30 lbs. is ample and most economical. Write for complete information and prices.

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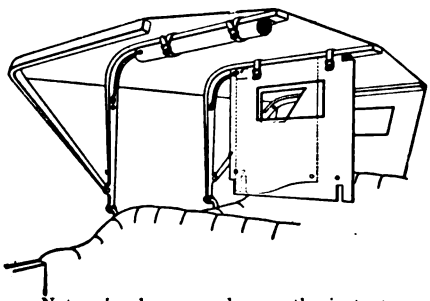

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Collins Always Ready Curtains

as regular equipment.

The *right* curtain for the *right* place every time. Simply slide the curtain down the curved bracket bar and snap into position.

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Dept. E **Jackson, Mich.**

"Our Grant Riveter has given us no end of Satisfaction."

So Writes One of Our Customers.

A boy or girl at $1.00 a day is all that is required to operate the machine with perfect success.

The machine will do better work and much more rapidly than can be done by any other machine on the market.

We invite you to send us samples of your work, which we shall rivet and return to you, giving estimate of output and any other information you may desire.

Send for catalog which shows several different sizes and styles of machines for different requirements.

The Grant Mfg. & Machine Co.

BRIDGEPORT, CONN.

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MACHINES (Continued)

TIRE BANDAGE WRAPPING MACHINES

MILLER, Chas. E., Anderson, Ind.
ROSSMAN, Roy G., Seattle, Wash.

UPHOLSTERY BUTTON MACHINES

LOUNSBERY & Sons, G. H., Cincinnati, O.
TUFTING Machine Supply Co., Detroit, Mich

UPHOLSTERY TUFTING MACHINES

BUSER-POSTON Tufting Machine Co., Chillicothe, O.
NOVELTY Tufting Machine Co., 268 Jefferson Ave. E., Detroit, Mich. **(See page 519.)**

VALVE SEATING MACHINES

(For Valve Seating Tools—See Tools, Valve Grinding)

AUTOMATIC Valve-Seating Machinery Co., Sioux City, Ia.
FOOTE-BURT Co., Cleveland, O.
TAYLOR & Fenn Co., Hartford, Conn.

WIRE SPOKE SWAGING MACHINES

LANGELIER Mfg. Co., Providence, R. I.

WOOD BENDING MACHINES

DEFIANCE Machine Works, Defiance, O.
FAY & Egan Co., J. A., Cincinnati, O.

WOOD BORING MACHINES

AJAX Mfg. Co., Pittsburg (N. S.), Pa.
AMERICAN Woodworking Machinery Co., Rochester, N. Y.
BENTEL & Margedant Co., Hamilton, O.
CORDESMAN, Meyer & Co., Cincinnati, O.
CORDESMAN-RECHTIN Co., Cincinnati, O.
DEFIANCE Machine Works, Defiance, O.
FAY & Egan Co., J. A., Cincinnati, O.
GREENLEE Bros. & Co., Rockford, Ill.
JONES Superior Machine Co., Chicago, Ill.
KANE & Roach, Syracuse, N. Y.
OBER Mfg. Co., Chagrin Falls, O.
OLIVER Machinery Co., Grand Rapids, Mich.
POWER & Co., L., Philadelphia, Pa.
PRYIBIL Machine Co., P., New York, N. Y.
SMITH Machine Co., H. B., Smithville, N. J.
VALLEY City Machine Works, Grand Rapids, Mich.

WOOD MORTISING AND TENONING MACHINES

AMERICAN Woodworking Machinery Co., Rochester, N. Y.
CORDESMAN-RECHTIN Co., Cincinnati, O.
DEFIANCE Machine Works, Defiance, O.
FAY & Egan Co., J. A., Cincinnati, O.
GREENLEE Bros. & Co., Rockford, Ill.
OLIVER Machinery Co., Grand Rapids, Mich.

MALLETS

WOODEN MALLETS

BLISS Mfg. Co., R., Pawtucket, R. I.
DELPHOS Mfg. Co., Delphos, O.
HELLENBERG Co., J. B., Coldwater, Mich.
PIQUA Handle & Mfg. Co., Piqua, O.
SANDUSKY Tool Co., Sandusky, O.
UNION Hardware Co., Torrington, Conn.

MANDRELS

EXPANDING MANDRELS

CHAMPION—See Western Tool & Mfg. Co.
LE COUNT, Wm. G., South Norwalk, Conn.
McCROSKY Reamer Co., Meadville, Pa.
MORSE Twist Drill & Machine Co., New Bedford, Mass.
NICHOLSON & Co., W. H., Wilkes-Barre, Pa.
WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

METERS

CUT METERS

AMERICAN Ever Ready Co., New York, N. Y. "Ever Ready."
EVER READY—See American Ever Ready Co.
STEWART-WARNER Speedometer Corp., 1904 Diversey Blvd., Chicago, Ill. "Warner." **(See page 365.)**
WARNER—See Stewart-Warner Speedometer Corp.

GASOLINE OR OIL METERS

BOWSER & Co., S. F., Fort Wayne, Ind.
BUFFALO Meter Co., Buffalo, N. Y. "Niagara."
HYDRAULIC Oil Storage & Engineering Co., New York, N. Y.
NEPTUNE Meter Co., New York, N. Y. "Trident."
NIAGARA—See Buffalo Meter Co.
TRIDENT—See Neptune Meter Co.

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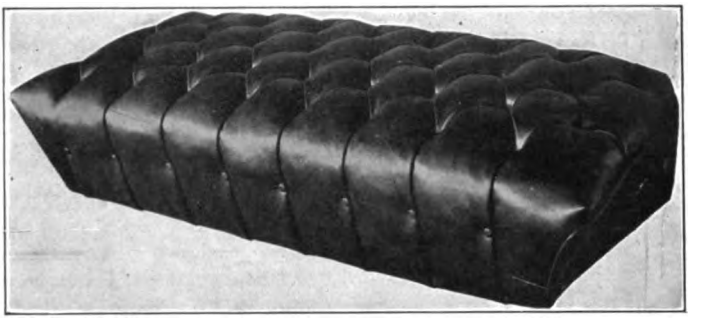

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This type of cushion is considered the acme of the Upholsterer's Art, and heretofore has been made only by hand. We are now in position to furnish devices (for which patents are pending) with which this type of cushion can be constructed at practically the same labor cost as the ordinary Soft-Faced or Spring-Edge Cushion.

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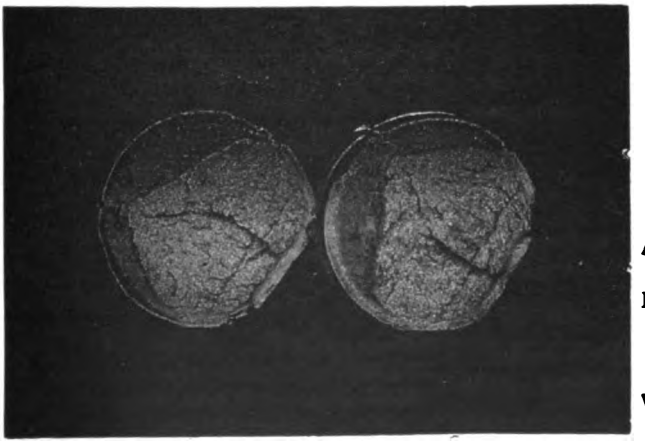

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Hardening
Annealing
Tempering
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Adding Machine Parts
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Machine Tool Spindles
Screw Machine Products
Stampings
Wrist Pins and Sleeves
Chain, Etc.

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AMERICAN METAL TREATMENT Co.

ELIZABETH, N. J.

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MICROMETERS

MICROMETER CALIPERS

BROWN & Sharpe Mfg. Co., Providence, R. I.
COLUMBIA—See Smith, E. G.
GOODELL-PRATT Co., Greenfield, Mass.
REED & Prince Mfg. Co., Worcester, Mass.
SLOCOMB Co., J. T., Providence, R. I.
SMITH, E. G., Columbia, Pa. "Columbia."
STARRETT Co., L. S., Athol, Mass.

MIXERS

RUBBER CEMENT MIXERS

AMERICAN Tool & Machine Co., Boston, Mass.
(See page 515.)

MOLDS

SOFT HAMMER MOLDS

HORAT. J., Dept. H., Lafayette, Ind.
(See page 521.)

TIRE VULCANIZING MOLDS AND CORES

BRIDGEWATER Machine Co., Akron, O.
MILLER, Chas. E., Anderson, Ind.
MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis.
(See page 445.)
WILLIAMS Foundry & Machine Co., Akron, O.

OVENS

CORE BAKING OVENS

BLODGETT Co., G. S., Burlington, Vt.
BYRAM & Co., Detroit, Mich.
CALUMET Foundry Equipment Co., Harvey, Ill.
FOUNDRY Equipment Co., Buffalo, N. Y.
GOETZ Co., Chicago, Ill.
HILL & Griffith Co., Cincinnati, O.
MILLETT Core Oven Co., Springfield, Mass.
MONARCH Engineering & Mfg. Co., Baltimore, Md.
OVEN Equipment & Mfg. Co., New Haven, Conn.
ROCKWELL Co., W. S., New York, N. Y.
WADSWORTH Core Machine & Equipment Co., Akron, O.
WHITING Foundry Equipment Co.. Harvey, Ill

ENAMELING OVENS

AMERICAN Enamel Co., Providence, R. I. "Mascot."
BLODGETT Co., G. S., Burlington, Vt.
CULLEN-ATKINSON Co., Hartford, Conn.
MASCOT—See American Enamel Co.
MONARCH Engineering & Mfg. Co., Baltimore, Md.
NEIL & Co., Wm., Chicago, Ill.
OVEN Equipment & Mfg. Co., New Haven Conn.
ROCKWELL Co., W. S., New York, N. Y.

PAPER

EMERY AND SAND PAPER

AMERICAN Glue Co., Boston, Mass. "Union," "New England," "Boston."
BAEDER, Adamson & Co., New York, N. Y.
BEHR & Co., Herman, New York, N. Y. "Brooklyn."
BOSTON—See American Glue Co.
BROOKLYN—See Behr & Co.
CARBORUNDUM Co., Niagara Falls, N. Y.
NEW ENGLAND—See American Glue Co.
UNION—See American Glue Co.
WAUSAU Abrasives Co., Wausau, Wis.

PLANERS

METAL PLANERS

AMERICAN Tool Works Co., Cincinnati, O.
BARTLETT, Edwin E., Boston, Mass. "Federal."
CHANDLER Planer Co., Ayer, Mass.
CINCINNATI Planer Co., Cincinnati, O.
CINCINNATI Shaper Co., Cincinnati, O.
FEDERAL—See Bartlett, Edwin E.
GRAY Co., G. A. Cincinnati, O.
HAMILTON Machine Tool Co., Hamilton, O.
KNECHT Planer Co., Cincinnati, O.
NILES-BEMENT-POND Co., New York, N. Y.
OHIO Machine Tool Co., Kenton, O.
POWELL Machine Co., Fitchburg, Mass.
PUTNAM Machine Co., Fitchburg, Mass.
ROCKFORD Machine Tool Co., Rockford, Ill.
STAPF & Co., John B., Dunkirk, N. Y.
WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.
WOODWARD & Powell Planer Co., Worcester, Mass.

WOOD PLANERS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.
BENTEL & Margedant Co., Hamilton, O.
BERLIN Machine Works, Beloit, Wis.
CONNELL & Dengler Machine Co., Rochester, N. Y.
CORDESMAN, Meyer & Co., Cincinnati, O.
CORDESMAN-RECHTIN Co., Cincinnati, O.
CRESCENT Machine Co., Leetonia, O.
DEFIANCE Machine Works, Defiance, O.
FALLS Machine Co., Sheboygan Falls, Wis.
FAY & Egan Co., J. A., Cincinnati, O.

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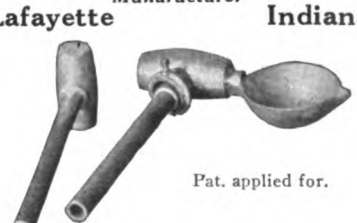

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PLANERS (Continued)

WOOD PLANERS (Continued)

GREAVES-KLUSMAN Tool Co., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

JONES Superior Machine Co., Chicago, Ill.

KANE & Roach, Syracuse, N. Y.

OLIVER Machinery Co., Grand Rapids, Mich.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

PRYIBIL Machine Co., P., New York, N. Y.

SCHNEIDER & Goosman Machine Co., Cincinnati, O.

SMITH Machine Co., H. B., Smithville, N. J.

VALLEY City Machine Works, Grand Rapids, Mich.

WHITNEY & Son, Baxter D., Winchendon, Mass.

PLANES

WOODWORKERS PLANES

BAILEY—See Stanley Rule & Level Co.

BEDROCK—See Stanley Rule & Level Co.

CHAPIN-STEVENS Co., Pine Meadow, Conn.

GAGE Tool Co., Vineland, N. J.

MACK & Co., Rochester, N. Y.

OHIO Tool Co., Charleston, W. Va.

SANDUSKY Tool Co., Sandusky, O.

SARGENT & Co., New Haven, Conn.

STANLEY Rule & Level Co., New Britain, Conn. "Bailey," "Bedrock."

PLATES

FOUNDRY RAPPING PLATES

ACME—See Everett & Son.

BENSKIN Mfg. Co., Canton, O. "Perfect."

CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y. "Acme." "Fraser."

FRASER—See Everett & Son.

HILL & Griffith Co., Cincinnati, O.

OLIVER Machinery Co., Grand Rapids, Mich.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

SCREW PLATES

(See Taps and Dies)

PLIERS

COMBINATION PLIERS

ATHOL Machine Co., Athol, Mass.

BARCALO Mfg. Co., Buffalo, N. Y. (See page 555.)

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BERNARD—See Scholhorn Co.

BILLINGS & Spencer Co., Hartford, Conn. "Hayden."

BONNER Tool Co., Champaign, Ill. "Victor."

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUFFUM Tool Co., Louisiana, Mo.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

CRESCENT Tool Co., Jamestown, N. Y. "Simplex." (See page 503.)

CRONK & Carrier Mfg. Co., Elmira, N. Y.

CURRIER-KOETH Mfg. Co., Coudersport, Pa. "K. I. T."

DANIELSON & Co., J. P., Jamestown, N. Y.

DUDLY Tool Co., Menominee, Mich.

ERIE Tool Works, Erie, Pa.

HARGRAVE—See Cincinnati Tool Co.

HAYDEN—See Billings & Spencer Co.

HERBRAND Co., Fremont, O.

HJORTH & Co., Wm., Jamestown, N. Y.

IRVINGTON Mfg. Co., Irvington, N. J. "Red Devil."

K. I. T.—See Currier-Koeth Mfg. Co.

KILBORN & Bishop Co., New Haven, Conn.

KRAEUTER & Co., Newark, N. J.

McKAIG Drop Forge Co., Buffalo, N. Y.

MOSSBERG Co., Frank, Attleboro, Mass. (See page 553.)

OSWEGO Tool Co., Oswego, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

RED DEVIL—See Irvington Mfg. Co.

REDD Mfg. Co., Erie, Pa.

S. & I. Co., Springfield, Mass.

SCHOLHORN Co., Wm., New Haven, Conn. "Bernard."

SHARK—See Wakefield Mfg. Co.

SIMPLEX—See Crescent Tool Co.

STARRETT Co., L. S., Athol, Mass.

VICTOR—See Bonner Tool Co.

VLCHEK Tool Co., Cleveland, O.

WAKEFIELD Mfg. Co., Wakefield, Neb. "Shark."

WEST Haven Mfg. Co., New Haven, Conn.

WORDEN, E. M., Ladysmith, Wis.

WRIGHT Wrench & Forging Co., Canton, O.

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(See Pliers, Combination)

ELECTRIC PORTABLE POLISHERS

(See Drills, Electric Portable)

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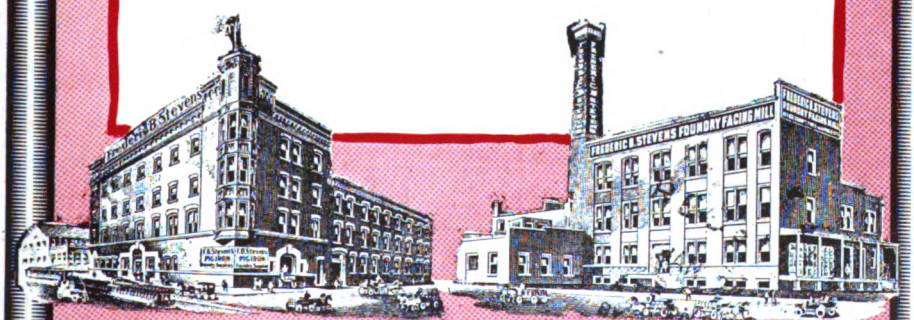

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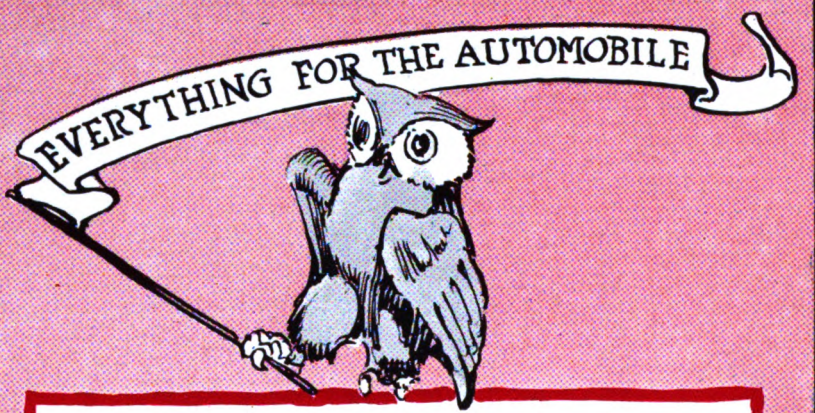

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POSTS

TOOL POSTS

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

O. K. Tool Holder Co., Shelton, Conn.

PRESSES

ARBOR PRESSES

BARNES Co., W. F. & John, Rockford, Ill.

BARTLETT, Edwin E., Boston, Mass. "Greenerd."

CLEVELAND Machine Specialty Co., Cleveland, O.

GEIER Co., P. A., Cleveland, O.

GREENERD—See Bartlett, Edwin E.

LEWISTON Motors, Lewiston, Me. "Whitney."

LOURIE Mfg. Co., Springfield, Ill.

LUCAS Macine Tool Co., Cleveland, O.

NILES-BEMENT-POND Co., New York, N. Y.

POST Garage & Repair Shop, Amos, Catskill, N. Y.

WHITNEY—See Lewiston Motors.

WILMARTH & Morman Co., Grand Rapids, Mich.

BENCH STRAIGHTENING PRESSES

CLEVELAND Machine Specialty Co., Cleveland, O.

COREY—See Steel Specialties Co.

GEIER Co., P. A., Cleveland, O.

SPRINGFIELD Machine Tool Co., Springfield, O.

STEEL Specialties Co., Boston, Mass. "Corey."

BROACHING PRESSES

BLISS Co., E. W., Brooklyn, N. Y.

BURR & Sons, J. T., Brooklyn, N. Y.

CONSOLIDATED Press & Tool Co., Hasting, Mich. (See page 527.)

LAPOINTE Co., J. N., New London, Conn.

LAPOINTE Machine Tool Co., Hudson, Mass.

PERKINS Machine Co., Warren, Mass.

STANDARD Machinery Co., Auburn, R. I. (See page 431.)

WATSON-STILLMAN Co., New York, N. Y.

POWER PRESSES

ADRIANCE Machine Works, Brooklyn, N. Y.

AMS Machine Co., Max, Mt. Vernon, N. Y.

ATLAS Machine Co., Waterbury, Conn.

BAIRD Machine Co., Bridgeport, Conn.

BLISS Co., E. W., Brooklyn, N. Y.

BRISTOL—See Garrigus Machine Co.

CADY Machine Co., Cleveland, O.

CLEVELAND Punch & Shear Works Co., Cleveland, O.

CONSOLIDATED Press & Tool Co., Hastings, Mich. (See page 527.)

COULTER & McKenzie Machine Co., Bridgeport, Conn.

FERRACUTE Machine Co., Bridgeton, N. J.

GARRIGUS Machine Co., C. G., Bristol, Conn. "Bristol."

HIBBARD Mfg. Co., Wm. H., Brooklyn, N. Y.

LA SALLE Machine & Tool Co., La Salle, Ill.

LEFFLER & Co., Chas., Brooklyn, N. Y.

MANVILLE Machine Co., E. J., Waterbury, Conn.

MASSILLON Foundry & Machine Co., Massillon, O.

MICHIGAN Press Co., Ypsilanti, Mich.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PERKINS Machine Co., Warren, Mass.

ROCKFORD Iron Works, Rockford, Ill.

SPRINGFIELD Machine Tool Co., Springfield, O.

STANDARD Machinery Co., Auburn, R. I. (See page 431.)

STOLL Co., D. H., Buffalo, N. Y.

SWAINE Mfg. Co., Fred J., St. Louis, Mo

TOLEDO Machine & Tool Co., Toledo, O.

V. & O. Press Co., Brooklyn, N. Y.

WATERBURY Farrell Foundry & Machine Co., Waterbury, Conn.

WILLARD Machine & Tool Co., Cincinnati, O.

ZEH & Hahnemann Co., Newark, N. J.

PULLERS

COTTER PIN PULLERS

BONNER Tool Co., Champaign, Ill. "Victor."

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUFFUM Tool Co., Louisiana, Mo.

CARVER Tool Works, Spring Valley, N. Y.

ELMORE Tool Mfg. Co., Hartford, Conn.

KRAEUTER & Co., Newark, N. J.

MARCY Tool Works, Putnam, Conn.

MOSSBERG Co., Frank, Attleboro, Mass. (See page 553.)

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 539.)

NELSON Mfg. Co., A., Chicago, Ill.

NOONAN Tool & Machine Works, A. S., Rome, N. Y.

S. & I. Co., Springfield, Mass.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VICTOR—See Bonner Tool Co.

VLCHEK Tool Co., Cleveland, O.

WORDEN, E. M., Ladysmith, Wis.

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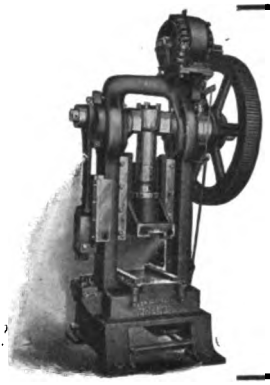

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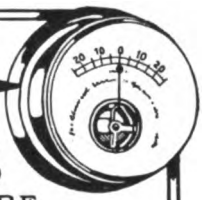

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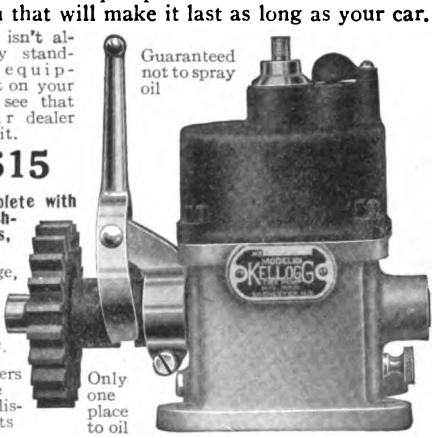

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COLLISON'S Garage, Burlington, Vt.

CRANE Puller Co., Arlington, Mass.

KERSCHBAUM, M. E., New York, N. Y.

LITTLE GIANT—See Premier Electric Co.

POLSON Mfg. Co., Buffalo, N. Y.

PREMIER Electric Co., Chicago, Ill. "Little Giant."

SCHWEPPE & Wilt Mfg. Co., Detroit, Mich.

PUMPS

GARAGE PUMPS AND AIR COMPRESSORS

A. B. C.—See Artizan Brass Co.

ACME Machine Works, Findlay, O.

ALDING—See Cast Iron Brazing & Mfg. Co.

ALLIS-CHALMERS Mfg. Co., Milwaukee, Wis.

AMERICAN Air Compressor Co., Detroit, Mich.

AMERICAN Electric Air Pump Co., 200 Barbeau St, Pittsburg, Pa. (See page 529.)

AMERICAN Steam Pump Co., Battle Creek, Mich.

APEX Electric Mfg. Co., Chicago, Ill.

ARTIZAN Brass Co., Chicago, Ill. "A. B. C."

AU-TO Compressor Co., Wilmington, O.

AUTO Air-Rotor Co., Auburn, N. Y.

BASTIAN—See General Utility Co.

BESSEMER Gas Engine Co., Grove City, Pa.

BINKS—See Star Brass Works.

BISHOP-BABCOCK-BECKER Co., Cleveland, O. "Eureka."

BLAISDELL Machine Co., Bradford, Pa.

BROWN Beer Pump Co., E. R., Boston, Mass. "Success."

BRUNNER Mfg. Co., Utica, N. Y. (See page 531.)

CALDWELL & Co., H. S., New York, N. Y.

CAST Iron Brazing & Mfg. Co., Manchester, N. H. "Alding."

CHAMPION—See Cleveland Faucet Co.

CHICAGO Pneumatic Tool Co., Chicago, Ill.

CHRISTENSEN Engineering Co., Milwaukee, Wis.

CLAYTON—See International Steam Pump Co.

CLEVELAND Faucet Co., Cleveland, O. "Champion."

COMSTOCK, A. S., Evanston, Ill.

CURTIS & Co., Mfg. Co., St. Louis, Mo.

CYCLONE—See Judd & Leland Mfg. Co.

DEAD EASY—See Globe Mfg. Co.

EUREKA—See Bishop-Babcock-Becker Co.

EUREKA—See Loppacker, Albert.

FAIRBANKS, Morse & Co., Chicago, Ill.

FT. WAYNE Engineering & Mfg. Co., Fort Wayne, Ind. "Paul."

GARDNER Governor Co., Quincy, Ill.

GEMMER-DETROIT Starter Co., Detroit, Mich.

GENERAL Electric Co., Schenectady, N. Y.

GENERAL Utility Co., Philadelphia, Pa. "Bastian."

GLEASON-PETERS Air Pump Co., Brooklyn, N. Y.

GLOBE Mfg. Co., Battle Creek, Mich. "Dead Easy."

GREEN & Swett Co., Boston, Mass. "Tri-Phoon."

GOULDS Mfg. Co., Seneca Falls, N. Y.

HALE Electric & Engineering Co., Cleveland, O. (See page 459.)

HARTFORD Machine Screw Co., 482 Capitol Ave., Hartford, Conn. "Master." (See page 297.)

HAYWARD Tire & Equipment Co., Indianapolis, Ind.

HERZ & Co., 245 W. 55th St., New York, N. Y. "Minimax." (See page 303.)

IMPERIAL—See Ingersoll-Rand Co.

INGERSOLL-RAND Co., New York, N. Y. "Imperial." (See page 529.)

INTERNATIONAL Steam Pump Co., New York, N. Y. "Clayton."

JACOBSON Machine Mfg. Co., Warren, Pa. (See page 483.)

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Cyclone," "Juleco." (See pages 269 and 321.)

JULECO—See Judd & Leland Mfg. Co.

KELLOGG Mfg. Co., Rochester, N. Y. (See page 527.)

LIPMAN Air Appliance Co., Beloit, Wis.

LITTLE GIANT—See Orange Machine & Mfg. Co.

LITTLE GIANT—See Varwig Mfg. Co.

LOPPACKER, Albert, Bloomfield, N. J. "Eureka."

MASTER—See Hartford Machine Screw Co.,

MAYO Mfg. Co., Chicago, Ill.

MINIMAX—See Herz & Co.

NAGLE Corliss Engine Works, Erie, Pa.

NATIONAL Brake & Electric Co., Milwaukee, Wis.

O. B.—See Universal Mfg. Co.

ORANGE Machine & Mfg. Co., Orange, N. J. "Little Giant."

OWEN Air Compressor Works, N. E., Springfield, O.

PAUL—See Ft. Wayne Engineering & Mfg. Co.

PEERLESS Accessories Manufacturers, Chicago, Ill.

PEQUOZ Electric Co., Cleveland, O.

PHILADELPHIA Timer & Machine Co., Philadelphia, Pa. (See page 489.)

ROHRBACHER Automatic Air Pump Co., Portland, Ore.

SARGENT Steam Meter Co., Chicago, Ill.

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 289.)

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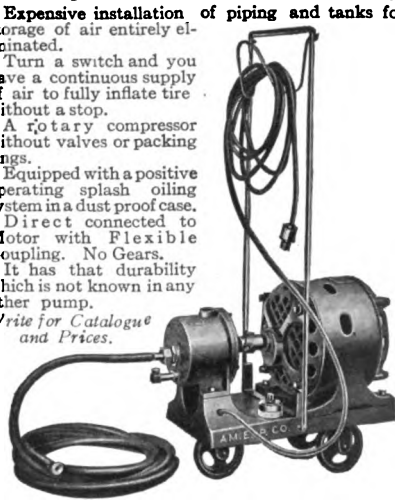

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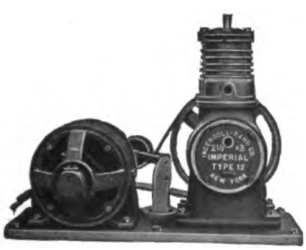

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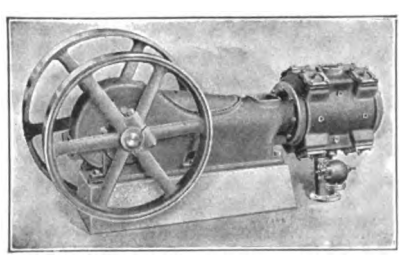

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PUMPS (Continued)

GARAGE PUMPS AND AIR COMPRESSORS (Continued)

SPICER Mfg. Co., Groton, Conn.

STAR Brass Works, Chicago, Ill. "Binks."

SUCCESS—See Brown Beer Pump Co.

SUPERIOR Machine & Engineering Co., Detroit, Mich. "Yale."

TRI-PHOON—See Green & Swett Co.

UNION Steam Pump Co., Battle Creek, Mich.

UNITED States Electrical Tool Co., Cincinnati, O. (See page 479.)

UNIVERSAL Mfg. Co., Minneapolis, Minn. "O. B."

VARWIG Mfg. Co., Cincinnati, O. "Little Giant."

VICTOR Electric Co., Chicago, Ill.

WESTINGHOUSE Air Brake Co., Pittsburg, Pa.

YALE—See Superior Machine & Engineering Co.

PUNCHES

PUNCHES AND SHEARS

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

BICKNELL Mfg. & Supply Co., Janesville, Wis.

BLISS Co., E. W., Brooklyn, N. Y.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CLARK Foundry Co., Rumford, Me.

CLEVELAND Punch & Shear Works Co., Cleveland, O.

CLOUGH, R. M., Tolland, Conn

EXCELSIOR Tool & Machine Co., East St. Louis, Ill. "X L C R."

FERRACUTE Machine Co., Bridgeton, N. J.

HUNTINGTON Machine & Foundry Co., Huntington, Ind.

KANE & Roach, Syracuse, N. Y.

LITTLE Giant Punch & Shear Co., Sparta, Ill.

LONG & Allstatter Co., Hamilton, O.

MASSILLON Foundry & Machine Co., Massillon, O.

MITTS & Merrill, Saginaw, Mich.

MOLINE—See Williams, White & Co.

NEW Doty Mfg. Co., Janesville, Wis.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PELS & Co., Henry, New York, N. Y.

PERKINS Machine Co., Warren, Mass.

QUICKWORK—See Smith, H. Collier.

ROBINSON Mfg. Co., J. M., Cincinnati, O.

ROCK River Machine Co., Janesville, Wis.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

SMITH, H. Collier, Detroit, Mich. "Quickwork."

STOLL Co., D. H., Buffalo, N. Y.

TOLEDO Machine & Tool Co., Toledo, O.

UNION Mfg. Co., New Britain, Conn.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

WHITING Co., Geo., Chicago, Ill.

WILLIAMS, White & Co., Moline, Ill. "Moline."

X L C R—See Excelsior Tool & Machine Co.

ARCH AND WASHER PUNCHES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

CENTER AND PRICK PUNCHES

BEALL Bros., Alton, Ill.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

BROWNE & Dowd Mfg. Co., Meriden, Conn.

BUFFUM Tool Co., Louisiana, Mo.

CARVER Tool Works, Spring Valley, N. Y.

CINCINNATI Tool Co., Norwood O., "Hargrave."

CRONK & Carrier Mfg. Co., Elmira, N. Y.

DEUSE, J. S., Chester, Conn.

EASY HOLD—See West Haven Mfg. Co.

ELMORE Tool Mfg. Co., Hartford, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVE—See Cincinnati Tool Co.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

MARCY Tool Works, Putnam, Conn.

MAYHEW Co., H. H., Shelburne Falls, Mass.

O. K.—See West Haven Mfg. Co.

PECK, Stow & Wilcox Co., Southington, Conn.

S. & I. Co., Springfield, Mass.

STARRETT Co., L. S., Athol, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

WEST Haven Mfg. Co., New Haven, Conn. "O. K.," "Easy Hold."

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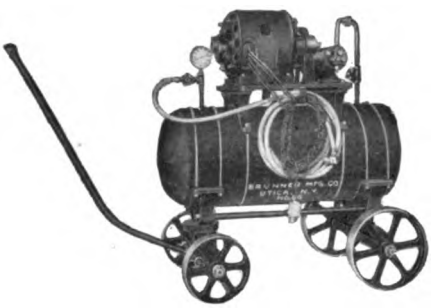

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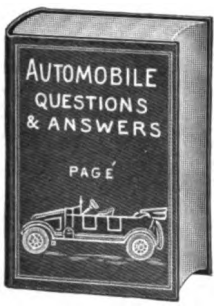

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CLOUGH, R. M., Tolland, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

EXCELSIOR Tool & Machine Co., East St. Louis, Ill. "Little Giant."

HUNTINGTON Machine & Foundry Co., Huntington, Ind.

KIDDER Mfg. Co., J. F., Burlington, Vt.

LITTLE GIANT—See Excelsior Tool & Machine Co.

LITTLE Giant Punch & Shear Co., Sparta, Ill.

MARVEL—See Armstrong-Blum Mfg. Co.

PELS & Co., Henry, New York, N. Y.

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

PRICK PUNCHES

(See Punches, Center and Prick)

WASHER PUNCHES

(See Punches, Arch and Washer)

PYROMETERS

ADVANCE—See Wilson-Maeulen Co.

BRISTOL Co., Waterbury, Conn.

BROWN Instrument Co., Philadelphia, Pa.

DU Vivier, Ernest H., New York, N. Y. (Importer.)

ESTERLINE Co., Indianapolis, Ind.

HANOVIA Chemical & Mfg. Co., Newark, N.J.

HOSKINS Mfg. Co., Detroit, Mich.

LE CHATELIER—See Wilson-Maeulen Co.

LEEDS & Northrup Co., Philadelphia, Pa.

PYROSCOPE—See Shore Instrument & Mfg. Co.

QUEEN-GRAY Co., Philadelphia, Pa.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

SHORE Instrument & Mfg. Co., New York, N. Y. "Pyroscope."

STUPAKOFF Laboratories, Pittsburg, Pa.

TAYLOR Instrument Cos., Rochester, N. Y. "Tycos."

THWING Instrument Co., Philadelphia, Pa.

TYCOS—See Taylor Instrument Cos.

UNIPIVOT—See Wilson-Maeulen Co.

WILSON-MAEULEN Co., New York, N. Y. "Advance," "Le Chatelier," "Unipivot."

ZAUBITZ, August, New York, N. Y.

RACKS

DRILL RACKS

DRIVER, C. H., Racine, Wis.

METAL TOOL AND STOCK RACKS

BERGER Mfg. Co., Canton, O.

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O.

DARBY & Sons Co., Edward, Philadelphia, Pa.

DURAND-STEEL Locker Co., Chicago, Ill.

FEDERAL Steel Fixture Co., Chicago, Ill.

HETTS Co., Detroit, Mich.

LYON Metallic Mfg. Co., Aurora, Ill.

MANUFACTURING, Equipment & Engineering Co., Boston, Mass.

MERRITT & Co., Camden, N. J.

NEW Britain Machine Co., New Britain, Conn.

OHIO Mfg. Co., Painesville, O.

TERRELL'S Equipment Co., Grand Rapids, Mich.

VAN Dorn Iron Works, Cleveland, O.

WESTERN Tool & Mfg. Co., Springfield, O.

REAMERS

STANDARD AND ADJUSTABLE REAMERS

ACME—See Schellenbach-Hunt Tool Co.

ADAMANTINE—See American Tap & Die Co.

AMERICAN Tap & Die Co., Greenfield, Mass. "Adamantine."
(See page 547.)

BILLINGS & Spencer Co., Hartford, Conn.

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CELFOR Tool Co., Buchanan, Mich.

CHADWICK & Trefethan, Portsmouth, N. H. "Critchley."

CLEVELAND Twist Drill Co., Cleveland, O. "Paradox," "Peerless."

CLOUGH, R. M., Tolland, Conn.

CRITCHLEY—See Chadwick & Trefethan.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich.
(See page 481.)

DIAMOND—See Whitman & Barnes Mfg. Co.

GISHOLT Machine Co., Madison, Wis.

GRANT Nail & Supply Co., Boston, Mass. "Turney."

GREEN RIVER—See Greenfield Tap & Die Co.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant," "Lightning," "Green River."

HERCULES—See Wells & Son Co.

KELLY Reamer Co., Cleveland, O.

LIGHTNING—See Greenfield Tap & Die Co.

LINCOLN-WILLIAMS Twist Drill Co., Taunton, Mass.

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ONE Lock Reamer Co., New Haven, Conn.

PARADOX—See Cleveland Twist Drill Co.

PEERLESS—See Cleveland Twist Drill Co.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

ROGERS Works, John M., Gloucester City, N. J.

SCHELLENBACH-HUNT Tool Co., Cincinnati, O. "Acme."

STANDARD Tool Co., Cleveland, O.

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WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

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HEALY Tool & Appliance Co., Buffalo, N. Y. (See page 521.)

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AMERICAN Sales Book Co., Elmira, N. Y.

AUTOGRAPHIC Register Co., Hoboken, N. J. "Shouperior."

EGRY Register Co., Dayton, O. (See page 535.)

McCASKEY Register Co., Alliance, O.

SHOUPERIOR—See Autographic Register Co.

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FOUNDRY RIDDLES AND SIEVES

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DARBY & Sons Co., Edward, Philadelphia, Pa.

DEAN & Co., Henry E., Worcester, Mass.

TAYLOR & Dean, Pittsburg, Pa.

TYLER Co., W. S., Cleveland, O.

WRIGHT Wire Co., Worcester, Mass.

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PERKINS Machine Co., Warren, Mass.

PETTINGELL Machine Co., Amesbury Mass.

ROCK River Machine Co., Janesville, Wis.

TOLEDO Machine & Tool Co., Toledo, O.

WHITCOMB-BLAISDELL Machine Tool Co Worcester, Mass.

WHITING Co., Geo., Chicago, Ill.

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CORDESMAN-RECHTIN Co., Cincinnati, O.

DEFIANCE Machine Works, Defiance, O.

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KANE & Roach, Syracuse, N. Y.

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CRESCENT Machine Co., Leetonia, O.

DEFIANCE Machine Works, Defiance, O.

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KANE & Roach, Syracuse, N. Y.

MARSTON & Co., J. M., Boston, Mass.

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POWER & Co., L., Philadelphia, Pa.

PRYIBIL Machine Co., P., New York, N. Y.

ROOT Co., B. M., York, Pa.

SILVER Mfg. Co., Salem, O.

SMITH Machine Co., H. B., Smithville, N. J.

WEST Side Iron Works, Grand Rapids, Mich.

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AMERICAN Woodworking Machinery Co., Rochester, N. Y.

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CATARACT Brass Stamping Corp., Buffalo, N. Y.

CORDESMAN, Meyer & Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

FAY & Egan Co., J. A., Cincinnati, O.

GREAVES-KLUSMAN Tool Co., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

MARSTON & Co., J. M., Boston, Mass.

OLIVER Machinery Co., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

PRYIBIL Machine Co., P., New York, N. Y.

ROOT Co., B. M., York, Pa.

SMITH Machine Co., H. B., Smithville, N. J.

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BURKE Machine Tool Co., Conneaut, O.

BURR & Sons, John T., Brooklyn, N. Y.

COCHRANE-BLY Co., Rochester, N. Y.

ESPEN-LUCAS Machine Works, Philadelphia, Pa.

HIGLEY Machine Co., New York, N. Y.

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LEA-SIMPLEX—See Lea Equipment Co.

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GREYHOUND—See Bishop & Co.

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DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DUPLEX—See Buffalo Specialty Co.

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GOODELL-PRATT Co., Greenfield, Mass.

HOEFER Mfg. Co., Freeport, Ill.

KWIK-KUT—See Atkins & Co.

MARVEL—See Armstrong-Blum Mfg. Co.

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MILLERS Falls Co., New York, N. Y.

MOTOR Parts Co., Plainfield, N. J.

NORTH Wales Machine Co., North Wales, Pa.

OLMSTED'S Son, L. H., Hasbrouck Heights, N. J.

RACINE Tool & Machine Co., Racine, Wis.

ROBERTSON Machine & Foundry Co. W., Buffalo, N. Y. "Economy."

ROYAL—See Frontier Iron Works.

STAR—See Miller's Falls Co.

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VICTOR—See Dayton Machine Works.

WESTERN Tool & Mfg. Co., Springfield, O.

WEST Haven Mfg. Co., New Haven, Conn. "Universal."

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CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

DEFIANCE Machine Works, Defiance, O.

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GREAVES-KLUSMAN Tool Co., Cincinnati, O.

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DISSTON & Sons, Henry, Philadelphia, Pa. "Premier."

HUNTER Saw & Machine Co., Pittsburg, Pa.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

PREMIER—See Disston & Sons.

SIMONDS Mfg. Co., Fitchburg, Mass.

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TAYLOR-NEWBOLD—See Tabor Mfg. Co.

TINDEL-MORRIS Co., Eddystone, Pa.

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BUFFUM Tool Co., Louisiana, Mo.

HAYES File Co., Detroit, Mich.

KRAEUTER & Co., Newark, N. J.

LUTZ—See Western Tool & Mfg. Co.

MARCY Tool Works, Putnam, Conn.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 539.)

VLCHEK Tool Co., Cleveland, O.

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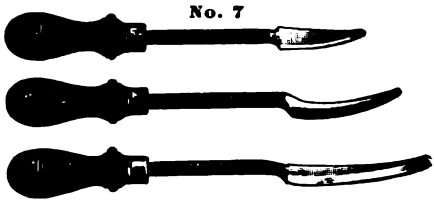

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PECK, Stow & Wilcox Co., Southington, Conn.
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SCREW SLOTTERS

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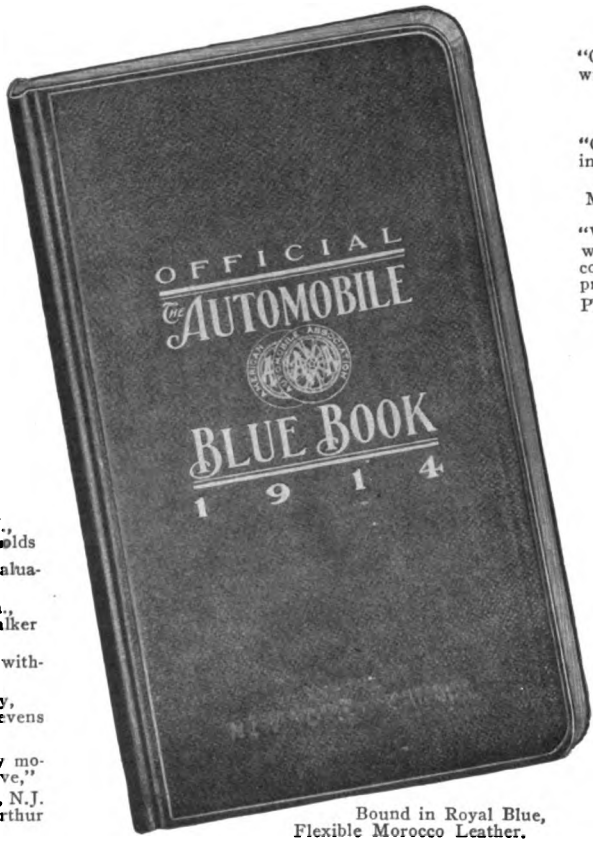

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METAL SNIPS OR SHEARS

ACME Shear Co., Bridgeport, Conn. "Ajax," "Star."

AJAX—See Acme Shear Co.

BARTLETT Mfg. Co., Detroit, Mich.

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.

CLAUSS Shear Co., Fremont, O.

DUDLY Tool Co., Menominee, Mich.

HEINISCH'S Sons Co., R., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

NATIONAL Cutlery Co., Philadelphia, Pa.

PECK, Stow & Wilcox Co., Southington, Conn.

STAR—See Acme Shear Co.

STORTZ & Son, John, Philadelphia, Pa.

WISS & Sons Co., J., Newark, N. J.

SOLDER

ALUMINUM SOLDER

ACME—See Universal Fluxine Co.

ALUMALUX Co., Sidney, O.

ALUMIFIX—See Specialties Sales Co.

ARROW—See Lester Co.

ATKINSON Co., Rochester, N. Y. (See page 315.)

CITY Brass Foundry Co., Cleveland, O.

ELECTRIC Smelting & Aluminum Co., Lockport, N. Y. (See page 503.)

GERMAN-AMERICAN Aluminum Co., New York, N. Y.

ILLINOIS Smelting & Refining Co., Chicago, Ill.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Richards." (See page 399.)

LANGSENKAMP, F. H., Indianapolis, Ind.

LESTER Co., Fayetteville, N. Y. "Arrow."

LUMEN Bearing Co., Buffalo, N. Y. (See page 191.)

MORE-JONES Brass & Metal Co., St. Louis, Mo.

NATIONAL Products Co., Kokomo, Ind.

RICHARDS—See Janney, Steinmetz & Co.

RICHARDS & Co., Boston, Mass.

SEMPER IDEM—See Wildes Son.

SPECIALTIES Sales Co., Kansas City, Mo. "Alumifix."

THWING, C. B., Philadelphia, Pa.

UNIVERSAL Fluxine Co., Urbana, O "Acme."

VAN Metal Co., Columbus, O.

WILDES Son, Thomas, New York, N. Y. "Semper Idem."

HALF AND HALF SOLDER

BIRKENSTEIN & Sons, S., 387-99 W. Ontario St., Chicago, Ill. (See page 417.)

BLATCHFORD Co., E. W., Chicago, Ill.

COLUMBIA Smelting & Refining Works, Brooklyn, N. Y.

EMPIRE Metal Co., Syracuse, N. Y.

GARDINER Metal Co., Chicago, Ill.

HENNING & Sons, V., Brooklyn, N. Y.

HOYT Metal Co., 300 N. Broadway, St. Louis, Mo. (See page 109.)

KAHN Bros., Brooklyn, N. Y.

LEHMAN Bros., Hoboken, N. J.

LISSBERGER & Son, Marks, Long Island City, N. Y.

LUMEN Bearing Co., Buffalo, N. Y. (See page 191.)

MERCHANT & Evans Co., Philadelphia, Pa.

MORE-JONES Brass & Metal Co., St. Louis, Mo.

NATIONAL Lead Co., New York, N. Y. (See page 215.)

OLD Roman Solder Co., New York, N. Y.

TAYLOR Co., N. & G., Philadelphia, Pa.

WILDES Son, Thomas, New York, N. Y.

SQUARES

MACHINISTS SQUARES

ATHOL Machine Co., Athol, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

STARRETT Co., L. S., Athol, Mass.

UNION Caliper Co., Orange, Mass.

STAMPS

STEEL STAMPS

(For Numbering or Lettering Parts)

BALZER Co., Gus., New York, N. Y.

BECKER Engraving Co., August, Boston, Mass.

CHANDLER Co., Springfield, Mass.

DUNKIRK Corp., Dunkirk, N. Y.

EVERETT & Son, A., Auburn, N. Y.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

KAUTZ & Co., Fred C., Chicago, Ill.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

MATTHEWS & Co., Jas. H., Pittsburg, Pa

MAYER Co., Geo. J., Indianapolis, Ind.

MURDOCK, Jr., Co., Jas., Cincinnati, O.

NESS, Jr., Geo. M., New York, N. Y.

NEW York Stencil Works, New York, N. Y.

NOBLE & Westbrook Mfg. Co., Hartford, Conn.

QUINT'S Sons Co., S. H., Philadelphia, Pa.

ROBBINS Mfg. Co., John, Boston, Mass.

SCHWERDTLE Stamp Co., Bridgeport, Conn.

WRIGHT & Son, Greg. G., Cincinnati, O

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MOTOR REPAIR STANDS

HACO—See Hathorn Auto Co.

HATHORN Auto Co., Mason City, Ia. "Haco."

PORTABLE TOOL STANDS

NEW BRITAIN Machine Co., 10 Bigelow St., New Britain, Conn. (See page 545.)

WESTERN Tool & Mfg. Co., Springfield, O.

STOCKS

DIE STOCKS

ACME—See American Tap & Die Co.

ADAMANTINE—See American Tap & Die Co.

AMERICAN Tap & Die Co., Greenfield, Mass. "Acme," "Adamantine." (See page 547.)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BAY State Tap & Die Co., Mansfield, Mass.

BESLY & Co., Charles H., Chicago, Ill.

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CARD Mfg. Co., S. W., Mansfield, Mass.

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I.

CONANT & Donelson Co., Conway, Mass. "Reliable."

DUPLEX—See Hart Mfg. Co.

ECONOMY—See Wells & Son Co.

GREEN RIVER—See Greenfield Tap & Die Co.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant," "Lightning," "Green River."

HART Mfg. Co., Cleveland, O. "Duplex."

LIGHTNING—See Greenfield Tap & Die Co.

LITTLE GIANT—See Greenfield Tap & Die Co.

LOWELL Wrench Co., Worcester, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

REECE Co., E. F., Greenfield, Mass.

RELIABLE—See Conant & Donelson.

THISTLE—See Winter Bros. Co.

WELLS & Son Co., F. E., Greenfield, Mass. "Economy."

WINTER Bros. Co., Wrentham, Mass. "Thistle."

STONES

RUBBING STONES

AMERICAN Stone Co., Floyds Knobs, Ind. "Perrettes."

BENDER BIMSSTEIN—See Thurston Co.

EUREKA—See Waddell & Co.

EUREKA Rubbing Stone Co., Chicago, Ill.

GAMBURGER-BIMSSTEIN—See Rodriguez, R. E.

PERRETTES—See American Stone Co.

RODRIGUEZ, R. E., New York, N. Y. (Importer.) "Gamburger Bimsstein."

SCHUMACHERSCHE—See Waddell & Co.

THURSTON Co., F. W., Chicago, Ill. (Importer.) "Bender Bimsstein."

WADDELL & Co., R. J., New York, N. Y. (Importers.) "Schumachersche," "Eureka."

WADSWORTH, Howland & Co., Boston, Mass.

STOOLS

STEEL STOOLS

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O.

ERIE Stamping & Mfg. Co., Erie, Pa.

KALAMAZOO Steel Goods Co., Kalamazoo, Mich.

MANUFACTURING Equipment & Engineering Co., Boston, Mass.

MERRITT & Co., Camden, N. J.

NEW Britain Machine Co., New Britain, Conn.

OHIO Mfg. Co., Painesville, O.

SUPPLIES

ELECTRO-PLATING SUPPLIES

(This is a list of Dealers in Electro-Plating Supplies who advertise in this Publication.)

ELECTRIC Smelting & Aluminum Co., Lockport, N. Y. (See page 503.)

FOUNDRY SUPPLIES

BRASS Founders Supply Co., Newark, N. J.

DETROIT Foundry Supply Co., Detroit, Mich.

HILL & Griffith Co., Cincinnati, O.

NIAGARA Devices, Buffalo, N. Y.

OBERMAYER Co., S., Cincinnati, O.

OSBORN Mfg. Co., Cleveland, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 517.)

SMITH Foundry Supply Co., J. D., Cleveland, O.

STEVENS, Frederic B., Detroit, Mich. (See pages 523 and 524.)

WOODISON Co., E. J., Detroit, Mich.

MACHINE SHOP, GARAGE AND FACTORY SUPPLIES

(This is a list of Dealers in Machine Shop, Garage and Factory Supplies, who advertise in this publication)

FRASSE & Co., Peter A., New York, N. Y. (See page 219.)

MONTGOMERY & Co., 105-07 Fulton St., New York, N. Y. (See page 551.)

Complete Index to Classification appears on Pages 8 to 26.

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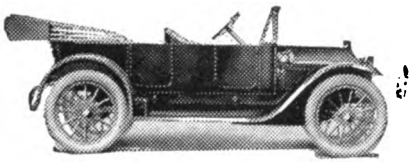
Paterson



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TILGHMAN-BROOKSAND Sand Blast Co., Philadelphia, Pa.

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CHEMICAL FIRE TANKS

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CHAMPION—See National Metal Stamping & Mfg. Co.

HOLLOWAY—See National Metal Stamping & Mfg. Co.

NATIONAL Metal Stamping & Mfg. Co., Newark, N. J. "Accurate," "Holloway," "Champion."

TAPES

MEASURING TAPES

KEUFFEL & Esser Co., Hoboken, N. J.

LUFKIN Rule Co., Saginaw, Mich.

STARRETT Co., L. S., Athol, Mass.

TAPS

TAPS AND DIES

ACME—See American Tap & Die Co.

ADAMANTINE—See American Tap & Die Co.

AMERICAN Tap & Die Co., Greenfield, Mass. "Adamantine," "Acme." (See page 547.)

BAY State Tap & Die Co., Mansfield, Mass.

BESLY Co., Charles H., Chicago, Ill.

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt. "Derby."

CARD Mfg. Co., S. W., Mansfield, Mass.

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CONANT & Donelson Co., Conway, Mass. "Reliable."

DERBY—See Butterfield & Co.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 481.)

GEOMETRIC Tool Co., New Haven, Conn.

GREEN RIVER—See Greenfield Tap & Die Co.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant," "Lightning," "Green River."

HELMET—See Besly & Co.

HERCULES—See Wells & Son Co.

LIGHTNING—See Greenfield Tap & Die Co.

LITTLE GIANT—See Greenfield Tap & Die Co.

MANUFACTURERS Equipment Co., Chicago, Ill.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 457.)

REED & Prince Mfg. Co., Worcester, Mass.

RELIABLE—See Conant & Donelson.

REMINGTON Tool & Machine Co., Woburn, Mass.

STANDARD Tool Co., Cleveland, O.

SUPERIOR Tap Co., Charlestown, N. H.

THISTLE—See Winter Bros. Co.

WEBSTER & Perks Tool Co., Springfield, O.

WELLS & Son Co., F. E., Greenfield, Mass. "Hercules."

WINTER Bros. Co., Wrentham, Mass "Thistle."

TOOLS

LATHE AND PLANER TOOLS

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

BILLINGS & Spencer Co., Hartford, Conn.

CHAMPION—See Western Tool & Mfg. Co.

JOHNSON—See Pratt & Whitney Co.

MARCY Tool Works, Putnam, Conn.

NOBLE & Westbrook Mfg. Co., Hartford, Conn.

O. K. Tool Holder Co., Shelton, Conn.

PRATT & Whitney Co., Hartford, Conn. "Johnson," "Rhodes," "Woodbridge." (See page 457.)

RHODES—See Pratt & Whitney Co.

STORTZ & Son, John, Philadelphia, Pa.

THOMPSON & Son Co., Henry G., New Haven, Conn.

WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

WOODBRIDGE—See Pratt & Whitney Co.

MOLDERS TOOLS

DOBSON, Wm., Canastota, N. Y.

MONK, Chas., Brooklyn, N. Y.

PLANER TOOLS

(See Tools, Lathe and Planer)

PNEUMATIC TOOLS

CHICAGO Pneumatic Tool Co., Chicago, Ill.

CLEVELAND Pneumatic Tool Co., Cleveland, O.

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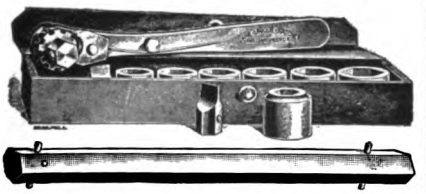

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PNEUMATIC TOOLS (Continued)

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DUNLAP Mfg. Co., Columbus, O.

GREEN—See Dayton Pneumatic Tool Co.

HELWIG Mfg. Co., St. Paul, Minn.

INDEPENDENT Pneumatic Tool Co., Chicago, Ill. "Thor."

INGERSOLL-RAND Co., New York, N. Y. "Little David." (See page 529.)

LITTLE DAVID—See Ingersoll-Rand Co.

MONARCH Pneumatic Tool Co., East St. Louis, Ill.

OLDHAM & Son Co., George, Philadelphia, Pa.

PITTSBURG Pneumatic Co., Canton, O.

THOR—See Independent Pneumatic Tool Co.

THREADING TOOLS

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

GEOMETRIC Tool Co., New Haven, Conn.

MODERN Tool Co., Erie, Pa.

RIVETT Lathe & Grinder Co., Boston, Mass.

TORCHES

GASOLINE OR KEROSENE TORCHES AND FURNACES

AMERICAN Stove Co. (Ringen Div.), St. Louis, Mo.

AMERICAN Stove Co. (Reliable Stove Co. Div.), Cleveland, O. "Reliable."

BABY—See McGill Mfg. Co.

BARTHEL—See Globe Gas Light Co.

BERNZ, Otto, Newark, N. J.

BEST Light Co., Canton, O.

CARLETON Co., Boston, Mass. "Imp."

CLAYTON & Lambert Mfg. Co., Detroit, Mich.

GLOBE Gas Light Co., Boston, Mass. "Barthel."

HAUCK Mfg. Co., Brooklyn, N. Y.

IMP—See Carleton Co.

McGILL Mfg. Co., Valparaiso, Ind. "Baby."

QUADRIGA Mfg. Co., Chicago, Ill. "Walters."

RELIABLE—See American Stove Co.

TURNER Brass Works, Sycamore, Ill.

VOLCANO Torch & Mfg. Co., Erie, Pa.

WALL Mfg. Supply Co., P., Pittsburg, Pa.

WALTERS—See Quadriga Mfg. Co.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

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TRAMMEL POINTS

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STARRETT Co., L. S., Athol, Mass.

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WOOD TRIMMERS

(Hand Power)

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OLIVER Machinery Co., Grand Rapids, Mich.

VISES

DRILL PRESS VISES

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

BLISSFIELD Motor Works, Blissfield, Mich. "Davenport."

BOWN Machine Co., Battle Creek, Mich.

CARTER & Hakes Co., Winsted, Conn.

CLEVELAND Machine Specialty Co., Cleveland, O.

DAVENPORT—See Blissfield Motor Works.

GRAHAM Mfg. Co., Providence, R. I.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

LIGHTNING—See Massey Vise Co.

MADDEN Bros. Co., Rushville, Ind.

MARVEL—See Armstrong-Blum Mfg. Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

MATHER & Warchter, Cleveland, O.

NORTH Wales Machine Co., North Wales, Pa.

PLUNKET, J. E., Chicago, Ill.

SKINNER Chuck Co., New Britain, Conn.

STERLING Grinding Wheel Co., Tiffin, O.

YOST Mfg. Co., G. M., Meadville, Pa.

HAND VISES

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

DIKEMAN Mfg. Co., Norwalk, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

LOWELL Wrench Co., Worcester, Mass.

MALLEABLE Iron Fittings Co., Branford, Conn. "Mifco." (See page 477.)

MIFCO—See Malleable Iron Fittings Co.

MILLER'S Falls Co., New York, N. Y.

PHOENIX Hardware Co., Buffalo, N. Y.

SMITH, Otis A., Rockfall, Conn.

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BARBOUR-STOCKWELL Co., Cambridgeport, Mass.

BARRETT Machine Tool Co., Meadville, Pa.

BONNEY Vise & Tool Works, Allentown, Pa. "Hercules," "Ajax."

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BULL DOG—See Prentiss Vise Co.

CLINCHER—See Massey Vise Co.

COLUMBIAN Hardware Co., Cleveland, O.

EMMERT Mfg. Co., Waynesboro, Pa. "Tiger."

ERIE Tool Works, Erie, Pa.

F & R—See Fulton Machine & Vise Co.

FISHER & Norris, Trenton, N. J.

FULTON Machine & Vise Co., Lowville, N. Y. "Star," "Peerless," "F. & R."

GOODELL-PRATT Co., Greenfield, Mass.

HERCULES—See Bonney Vise & Tool Works.

HOLLANDS Mfg. Co., Erie, Pa.

HOWARD Iron Works, Buffalo, N. Y.

JERSEY—See Stanley Rule & Level Co.

LEWIS—See Prentiss Vise Co.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Clincher," "Perfect," "Lightning."

MERRILL Bros., Maspeth, N. Y.

MONARCH—See Prentiss Vise Co.

PARKER Co., Charles, Meriden, Conn.

PEERLESS—See Fulton Machine & Vise Co.

PERFECT—See Massey Vise Co.

PHOENIX Hardware Co., Buffalo, N. Y.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

PRENTISS Vise Co., New York, N. Y. "Anchor," "Bull Dog," "Lewis," "Monarch," "Rapid Transit."

RAPID TRANSIT—See Prentiss Vise Co.

REED Mfg. Co., Erie, Pa.

ROCK Island Mfg. Co., Rock Island, Ill.

SIMPSON—See Athol Machine Co.

STANLEY Rule & Level Co., New Britain, Conn. "Jersey."

STAR—See Fulton Machine & Vise Co.

TIGER—See Emmert Mfg. Co.

YOST Mfg. Co., G. M., Meadville. Pa.

MILLING MACHINE VISES

CARTER & Hakes Co., Winsted, Conn.

HENDLEY Machine Co., Torrington, Conn.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

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ABERNATHY Vise & Tool Co., Chicago, Ill.

ATHOL Machine Co., Athol, Mass.

AYES & Co., Chicago, Ill.

BARBOUR-STOCKWELL Co., Cambridgeport, Mass. "Chandler & Washburn."

BLAKE—See Prentiss Vise Co.

BONNEY Vise & Tool Works, Allentown, Pa.

CHANDLER & WASHBURN—See Barbour-Stockwell Co.

CLINCHER—See Massey Vise Co.

COLUMBIAN Hardware Co., Cleveland, O.

EMMERT Mfg. Co., Waynesboro, Pa.

FISHER & Norris, Trenton, N. J.

HOLLANDS Mfg. Co., Erie, Pa.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Lightning," "Clincher."

OLIVER Machinery Co., Grand Rapids, Mich.

PARKER Co., Charles, Meriden, Conn.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

PRENTISS Vise Co., New York, N. Y. "Blake."

ROCK Island Mfg. Co., Rock Island, Ill.

TOLES Co., W. C., Chicago, Ill.

YOST Mfg. Co., G. M., Meadville, Pa.

PIN VISES

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

GOODELL-PRATT Co., Greenfield, Mass.

LOWELL Wrench Co., Worcester, Mass.

STARRETT Co., L. S., Athol, Mass.

PIPE VISES

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BLAKE—See Prentiss Vise Co.

DIKEMAN Mfg. Co., Norwalk, Conn.

EMMERT Mfg. Co., Waynesboro, Pa. "Tiger."

ERIE Tool Works, Erie, Pa.

FISHER & Norris, Trenton, N. J.

HOLLANDS Mfg. Co., Erie, Pa.

IDEAL—See Orange Machine & Mfg. Co.

MAGIC—See Prentiss Vise Co.

MARK Mfg. Co., Chicago, Ill.

MASSEY Vise Co., Chicago, Ill. "Perfect."

MONARCH—See Prentiss Vise Co.

ORANGE Machine & Mfg. Co., Orange, N. J. "Ideal."

OSWEGO Tool Co., Oswego, N. Y.

PARKER Co., Charles, Meriden, Conn.

PERFECT—See Massey Vise Co.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

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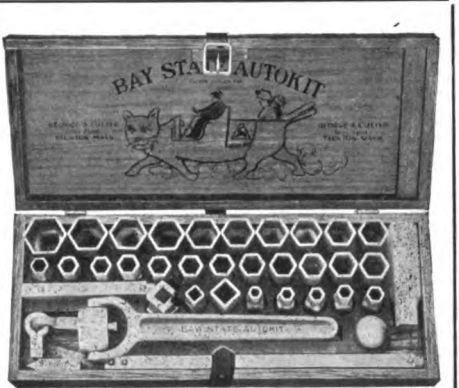

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STEVENS, Frederic B., Detroit, Mich. (See pages 523 and 524.)

WILLIAMSVILLE Buff Mfg. Co., Danielson, Conn.

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AMERICAN Emery Wheel Works, Providence, R. I.

BAY State Emery Wheel Co., Worcester, Mass.

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CORTLAND Corundum Wheel Co., Cortland, N. Y.

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HART—See Detroit Emery Wheel Co.

NATIONAL Corundum Wheel Co., Buffalo, N. Y.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

NORTON Co., Worcester, Mass.

PIKE Mfg. Co., Pike, N. H.

PITTSBURG Emery Wheel Co., Pittsburg, Pa.

SAFETY Emery Wheel Co., Springfield, O.

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AMERICAN Thermo Ware Co., New York, N. Y. (Importers.) "Hercules."

ARMSTRONG Bros. Tool Co., 304 N. Francisco Ave., Chicago, Ill. (See page 501.)

AUTO CLE—See Mossberg Co.

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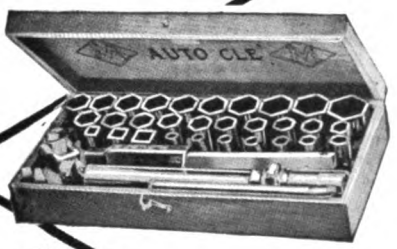

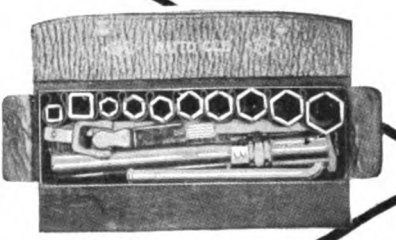

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AZADIAN Gauge Mfg. Co., Syracuse, N. Y. "Auto King."

B. & C.—See Bemis & Call Hardware & Tool Co.

BARCALO Mfg. Co., Buffalo, N. Y. **(See page 555.)**

BARNES Tool Co., New Haven, Conn.

BARNSLEY—See Automatic Wrench Co.

BAY STATE AUTOKIT—See Cutter, Geo. A.

BEMIS & Call Hardware & Tool Co., Springfield, Mass. "B. & C."

BILLINGS & Spencer Co., Hartford, Conn.

BONNER Tool Co., Champaign, Ill. "Victor."

BONNEY Vise & Tool Works, Allentown, Pa.

BORNSTEIN & Co., Ipswich, Mass.

BOSSERT Co., Utica, N. Y. **(See page 217.)**

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.

BUFFUM Tool Co., Louisiana, Mo.

C. M. B. Wrench Co., Garwood, N. J. "Silver King." "Auto Queen."

CHAMBERLAIN Wrench Co., Geneva, Ill.

CHAMPION—See Syracuse Wrench Co.

COCHRAN Pipe Wrench Mfg. Co., Chicago, Ill. "Speednut."

COES Wrench Co., Worcester, Mass.

CONVERTIBLE Ratchet Wrench Co., Allentown, Pa.

CRESCENT Tool Co., Jamestown, N. Y. **(See page 503.)**

CRONK & Carrier Mfg. Co., Elmira, N. Y.

CUTTER, Geo. A., Taunton, Mass. "Bay State Autokit." "Stickit." **(See page 551.)**

DAYTON Malleable Iron Co., Dayton, O.

DIAMOND—See Mossberg Co.

DUDLY Tool Co., Menominee, Mich.

EAGLE Claw Wrench Co., Rockford, Ill.

EAMES Tool Co., Swampscott, Mass.

EMPIRE—See Hjorth & Co.

ERIE Stamping & Mfg. Co., Erie, Pa. "Esco."

ESCO—See Erie Stamping & Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." **(See page 87.)**

GEMCO—See Garage Equipment Mfg. Co.

GIRARD Wrench Mfg. Co., Girard, Pa.

GLOBE Wrench Co., Ipswich, Mass.

GREENFIELD Tap & Die Co., Greenfield, Mass. "Little Giant."

GRIPSALL—See Mossberg Co.

GUERNSEY, C. C., Derry, N. H.

HARRIS & Reed Mfg. Co., Chicago, Ill.

HERBRAND Co., Fremont, O.

HERCULES—See American Thermo Ware Co.

HJORTH & Co., Wm., Jamestown, N. Y. "Empire."

INDIANAPOLIS Drop Forging Co., Indianapolis, Ind.

KEYSTONE—See Providence Auto Equipment

KEYSTONE Mfg. Co., Buffalo, N. Y. "Westcott."

KILBORN & Bishop Co., New Haven, Conn. "Saxon."

LAKESIDE Forge Co., Erie, Pa.

LAMSON & Sessions Co., Cleveland, O.

LANE, Will B., 180 N. Dearborn St., Chicago, Ill. "Unique." **(See page 547.)**

LITTLE GIANT—See Greenfield Tap & Die Co.

LOWELL Wrench Co., Worcester, Mass.

LOWENTRAUT Mfg. Co., P., Newark, N. J. "U. S."

MICHIGAN Bolt & Nut Works, Detroit, Mich.

MOORE Drop Forging Co., Springfield, Mass.

MOSSBERG Co., Frank, Attleboro, Mass. "Sterling," "Diamond," "Alderman," "National," "Auto Cle," "Gripsall." **(See page 553.)**

NATIONAL—See Mossberg Co.

NEW Britain Mfg. Co., New Britain, Conn.

NEW England Forge Co., Worcester, Mass.

NIAGARA Falls Metal Stamping Works, Niagara Falls, N. Y. "Pokitrenchiz."

PACKER Auto Specialty Co., Chicago, Ill. "Ray."

PAGE-STORMS Drop Forge Co., Chicopee, Mass.

PECK, Stow & Wilcox Co., Southington, Conn.

PERFECT HANDLE—See Smith & Co.

PICK-UP—See New Britain Mfg. Co.

POKITRENCHIZ—See Niagara Falls Metal Stamping Works.

PROVIDENCE Auto Equipment Co., Providence, R. I. "Keystone."

QUIXET—See S. & A. Mfg. Co.

RAY—See Packer Auto Specialty Co.

REX Wrench Co., Boston, Mass.

RONSON Specialty Co., Newark, N. J.

S. & A. Mfg. Co., Boston, Mass. "Quixet."

S. & I. Co., Springfield, Mass.

SAXON—See Kilborn & Bishop Co.

SCHOENBORN, A. J., Greenleaf, Kans.

SILVER KING—See C. M. B. Wrench Co

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SPEEDNUT—See Cochran Pipe Wrench Mfg. Co.

STARRETT Co., L. S., Athol, Mass.

STERLING—See Mossberg Co.

STICKIT—See Cutter, Geo. A.

SYRACUSE Wrench Co., Syracuse, N. Y. "Champion," "Yala."

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., Roxbury, Mass. "Trimo." **(See page 555.)**

TURNER & Deegan, Bristol, Conn.

U. S.—See Lowentraut Mfg. Co.

Complete Index to Classification appears on Pages 8 to 26.

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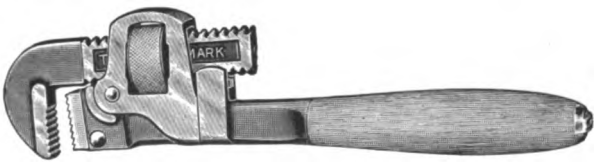

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NUT AND BOLT WRENCHES (Continued)

UNIQUE—See Lane, Will B.

VICTOR—See Bonner Tool Co.

VLCHEK Tool Co., Cleveland, O.

WAKEFIELD, Clarence E., Worcester, Mass.

WALDEN Mfg. Co., 69 Beacon St., Worcester, Mass.
(See page 555.)

WESTCOTT—See Keystone Mfg. Co.

WHITMAN & Barnes Mfg. Co., Akron, O.

WILLIAMS & Co., J. H., Brooklyn, N. Y.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 157.)

WRIGHT Wrench & Forging Co., Canton, O.

YALA—See Syracuse Wrench Co.

PIPE WRENCHES

AJAX Wrench Co., Toledo, O.

AMERICAN—See Rogers-Shear Co.

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BONNER Tool Co., Champaign, Ill. "Victor."

BONNEY Vise & Tool Works, Allentown, Pa. "Vixen."

COCHRAN Pipe Wrench Mfg. Co., Chicago, Ill.

DANIELSON & Co., J. P., Jamestown, N. Y.

DUDLY Tool Co., Menominee, Mich.

EMPIRE—See Hjorth & Co.

ERIE Stamping & Mfg. Co., Erie, Pa. "Esco."

ERIE Tool Works, Erie, Pa.

ESCO—See Erie Stamping & Mfg. Co.

FAIRBANKS—See Rogers-Shear Co.

HJORTH & Co., Wm., Jamestown, N. Y. "Empire."

IRELAND Pipe Wrench Co., Boston, Mass.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Westcott."

LEADER—See Ripley Pipe Wrench Co.

MOORE Drop Forging Co., Springfield, Mass.

OSWEGO Tool Co., Oswego, N. Y.

RIPLEY Pipe Wrench Co., Ripley, N. Y. "Leader."

ROEBLING'S Sons Co., John A., Trenton, N. J.

ROGERS-SHEAR Co., Warren, Pa. "American," "Fairbanks."

SHAW Propeller Co., Boston, Mass.

STILLSON—See Walworth Mfg. Co.

STOVER—See Wright Wrench & Forging Co.

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., Roxbury, Mass. "Trimo."
(See page 555.)

VICTOR—See Bonner Tool Co.

VIXEN—See Bonney Vise & Tool Works.

WALWORTH Mfg. Co., Boston, Mass. "Stillson."

WELLS & Son Co., F. E., Greenfield, Mass.

WESTCOTT—See Keystone Mfg. Co.

WRIGHT Wrench & Forging Co., Canton, O. "Stover."

TAP AND REAMER WRENCHES

ADAMANTINE—See American Tap & Die Co.

ALERT Tool Co., 221-23 N. 23d St., Philadelphia, Pa.
(See page 551.)

AMERICAN Tap & Die Co., Greenfield, Mass. "Adamantine."
(See page 547.)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BAY State Tap & Die Co., Mansfield, Mass.

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BESLY & Co., Charles H., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CARD Mfg. Co., S. W., Mansfield, Mass.

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I. "Nichols."

CONANT & Donelson Co., Conway, Mass. "Reliable."

DIKEMAN Mfg. Co., Norwalk, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

GREEN RIVER—See Greenfield Tap & Die Co.

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Tables and Data

PART IV

Reference Tables, Data and Formulæ, including Reports on Tests of Materials, S. A. E. Standards, etc., also a Directory of National Trade Associations

A complete index to this section appears on pages 27 to 30

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If It's a Gauge

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PART IV

TABLES AND DATA

REFERENCE TABLES FOR INDICATED HORSEPOWER

It is often convenient to have a ready reference table, by the aid of which an immediate approximation to the horsepower of a motor can be made when the bore and stroke are known. Such a table has been prepared by Worby Beaumont, the well-known English engineer, who gave permission to the editor of *The Automobile Club Journal* in London to publish it. One table gives the ratings of engines with the cylinder dimensions in inches and fractions, and the other table gives the results with cylinders built to metric measurements. Of course, in a table of this sort, an arbitrary set of conditions as to revolutions, mean effective pressure and mechanical efficiency have to be assumed; those employed represent average practice and the table is not offered as a substitute for experimentation when the most accurate results are desired.

It will be noted from Table I that in a very small space the estimated indicated power of engines with bore and stroke dimensions varying from 2-in. bore and 2-in. stroke to 6-in. bore and 6 1-2-in. stroke is given. Similarly, in Table II, a similar series is given in metric measurement, covering sizes from 70 mm. bore and 70 mm. stroke to 150 mm. bore and 165 mm. stroke. In Table I there is a quarter of an inch difference of size of bore and stroke measurements between any two powers given, and in Table II a difference of 5 mm. In explanation of the tables, it will be seen that in column 1 the bore or cylinder diameter of the engine may be found, and in the columns to the right of this, commencing with the column headed 0, the power of the engine having that cylinder diameter and a stroke of the same dimension. Columns 3 to 10 in each table give the powers of engines of, for instance, the same bore, but having a stroke greater than the bore by the amount stated at the top of the column. For example, referring to Table I, an engine having a cylinder 4 inches in diameter and a stroke of 4 inches would develop, under conditions to be stated, 4.27 i.h.p., as shown in the column headed 0; that is, column 2. If, however, the engine has a cylinder bore of 4 inches and a stroke of 5 1-2 inches, then the power developed is as shown in column 8, 5.89 i.h.p.

Similarly, for example, referring to Table II, an engine having a bore and stroke of 100 mm. would give 4.09 i.h.p., and an engine with a cylinder 100 mm. diameter and 140 mm. stroke would give 5.72 i.h.p.

It will be observed that to each bore dimension in column 1, two horizontal lines are given. The first of these gives the calculated power at a speed of 750 revolutions per minute, and the second the power at 1,000 revolutions per minute. The figures for the higher speed are printed in italic type.

The powers given in the tables represent the calculated indicated power given by one cylinder, and when multi-cylinder engines are being considered, the power shown by the table must be multiplied by the number of cylinders to give the total power.

To determine the useful power or brake horsepower, the mechanical efficiency of the engine has to be considered. No general rule can be given for this, and it may vary from a little less than 80 per cent. of the indicated power to as much as 88 per cent. For the majority of four-cylinder engines of good design and in good condition, run at speeds not unsuited to their design, and for powers of not less than 20 b.h.p., the efficiency may be considered to be 85 per cent. within reasonably close limits of accuracy. This figure is, however, merely suggestive, and it is necessary to be familiar with engine design and performances to correctly estimate the brake horsepower from the estimated indicated power of these small high-speed engines.

Very frequently an approximation to the calculated indicated power, or power developed in the cylinders, is all that is required to be known, and this may be taken direct from the tables, for the two named speeds; *i.e.*, 750 or 1,000 revolutions per minute. For other speeds the difference may be taken as arithmetically proportionate through a limited range according to the type and design of the engine.

(*Continued on page* 560)

Index to Tables and Data appears on Pages 27 to 30.

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HORSE POWER TABLE I—Cylinder Dimensions in Inches and Fractions

Bore	0	¼	½	¾	1	¼	½	¾	^
2.....	0.54	0.60	0.67	0.74	0.81	0.88	0.94	1.01	1.08
	0.72	0.80	0.89	0.98	1.08	1.17	1.25	1.35	1.44
2¼.....	0.76	0.84	0.92	1.01	1.09	1.18	1.26	1.35	1.43
	1.01	1.12	1.22	1.34	1.45	1.57	1.68	1.81	1.90
2½.....	1.04	1.15	1.25	1.35	1.46	1.56	1.67	1.77	1.88
	1.39	1.53	1.67	1.81	1.95	2.09	2.23	2.37	2.51
2¾.....	1.39	1.51	1.64	1.77	1.89	2.02	2.14	2.27	2.40
	1.85	2.02	2.19	2.36	2.55	2.70	2.87	3.04	3.20
3.....	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	3.00
	2.40	2.60	2.80	3.00	3.21	3.40	3.61	3.81	4.00
3¼.....	2.30	2.47	2.65	2.82	3.00	3.18	3.36	3.53	3.70
	3.06	3.28	3.52	3.76	3.99	4.22	4.45	4.70	4.92
3½.....	2.86	3.06	3.27	3.48	3.68	3.88	4.09	4.30	4.50
	3.81	4.09	4.36	4.63	4.90	5.18	5.45	5.72	6.00
3¾.....	3.53	3.76	4.00	4.35	4.47	4.71	4.95	5.18	5.41
	4.71	5.02	5.34	5.65	5.97	6.28	6.60	6.91	7.23
4.....	4.27	4.65	4.81	5.08	5.35	5.61	5.89	6.15	6.41
	5.71	6.06	6.42	6.78	7.13	7.50	7.85	8.20	8.55
4¼.....	5.13	5.44	5.74	6.04	6.34	6.64	6.95	7.25	7.55
	6.84	7.24	7.64	8.05	8.45	8.85	9.25	9.66	10.06
4½.....	6.19	6.53	6.87	7.22	7.56	7.90	8.25	8.59	8.93
	8.25	8.68	9.16	9.62	10.08	10.54	10.96	11.41	11.89
4¾.....	7.18	7.55	7.94	8.31	8.70	9.07	9.45	9.82	.....
	9.57	10.07	10.57	11.09	11.58	12.08	12.59	13.09	.....
5.....	8.38	8.80	9.22	9.65	10.05	10.46	10.90	.....	.....
	11.16	11.72	12.28	12.84	13.40	13.95	14.50	.....	.....
5¼.....	9.70	10.16	10.62	11.09	11.54	12.00	.....	.....	.....
	12.92	13.54	14.15	14.76	15.40	16.00	.....	.....	.....
5½.....	11.12	11.65	12.15	12.66	13.15	.....	.....	.....	.....
	14.84	15.51	16.20	16.86	17.54	.....	.....	.....	.....
5¾.....	12.71	13.27	13.82	14.38	.....	.....	.....	.....	.....
	16.96	17.70	18.42	19.10	.....	.....	.....	.....	.....
6.....	14.45	15.05	15.65	.....	.....	.....	.....	.....	.....
	19.25	20.05	20.85	.....	.....	.....	.....	.....	.....

(*Continued on page* 561)

Index to Tables and Data appears on Pages 27 to 30.

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HORSE POWER TABLE II—Cylinder Dimensions in Millimeters (Metric System)

Bore	0	5	10	15	20	25	30	35	40
70.....	1.40	1.50	1.59	1.69	1.80	1.89	1.99	2.10	2.20
	1.87	2.00	2.13	2.26	2.40	2.53	2.66	2.80	2.94
75.....	1.72	1.84	1.95	2.07	2.18	2.29	2.41	2.53	2.64
	2.30	2.45	2.60	2.76	2.91	3.06	3.22	3.37	3.52
80.....	2.09	2.23	2.35	2.49	2.62	2.76	2.88	3.02	3.14
	2.70	2.97	3.14	3.32	3.49	3.67	3.84	4.02	4.19
85.....	2.43	2.65	2.80	2.95	3.09	3.24	3.39	3.54	3.69
	3.34	3.54	3.73	3.93	4.12	4.32	4.52	4.72	4.91
90.....	2.97	3.14	3.30	3.46	3.64	3.80	3.96	4.13	4.30
	3.96	4.18	4.40	4.62	4.85	5.06	5.28	5.50	5.72
95.....	3.50	3.68	3.87	4.05	4.24	4.42	4.61	4.80	4.98
	4.67	4.91	5.16	5.40	5.65	5.90	6.15	6.40	6.64
100.....	4.09	4.29	4.49	4.70	4.90	5.11	5.30	5.51	5.72
	5.45	5.71	5.99	6.26	6.58	6.81	7.07	7.35	7.62
105.....	4.73	4.95	5.17	5.40	5.63	5.85	6.08	6.30	6.53
	6.30	6.60	6.90	7.20	7.50	7.80	8.10	8.40	8.70
110.....	5.43	5.69	5.93	6.19	6.44	6.68	6.96	7.16	7.42
	7.23	7.58	7.90	8.25	8.57	8.90	9.23	9.55	9.90
115.....	6.22	6.48	6.77	7.03	7.30	7.56	7.85	8.11	8.37
	8.30	8.65	9.02	9.38	9.74	10.01	10.46	10.81	11.18
120.....	7.07	7.37	7.66	7.96	8.25	8.53	8.84	9.13	9.41
	9.42	9.82	10.21	10.61	11.00	11.39	11.79	12.18	12.57
125.....	7.97	8.30	8.63	8.94	9.25	9.57	9.89	10.21	10.54
	10.64	11.06	11.50	11.91	12.34	12.76	13.20	13.61	14.04
130.....	8.95	9.30	9.65	9.90	10.34	10.70	11.01	11.38	.....
	11.94	12.40	12.86	13.31	13.79	14.25	14.70	15.16	.....
135.....	10.08	10.44	10.80	11.18	11.56	11.92	12.30	.....	.....
	13.41	13.91	14.40	14.90	15.41	15.90	16.40	.....	.....
140.....	11.22	11.65	12.04	12.44	12.84	13.25	.....	.....	.....
	14.99	15.51	16.05	16.60	17.12	17.68	.....	.....	.....
145.....	12.52	12.98	13.41	13.82	14.25	.....	.....	.....	.....
	16.70	17.30	17.88	18.42	19.00	.....	.....	.....	.....
150.....	13.81	14.26	14.72	15.40	.....	.....	.....	.....	.....
	18.41	19.01	19.64	20.23	.....	.....	.....	.....	.....

Index to Tables and Data appears on Pages 27 to 30.

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HORSE-POWER OF INTERNAL COMBUSTION MOTORS (H. H. BROWN)

Owing to the great number of factors which influence the power delivered by high speed internal combustion engines the only sure way of determining this is by a brake test Nevertheless, for purposes of easy comparison or for a basis for handicapping, various authorities and associations have compiled various formulas from which the approximate D. H. P. can be calculated when certain data are known. In some cases a certain piston speed is assumed, while in others a certain r. p. m. is assumed. In these cases only the diameter and the stroke of the piston need be known.

In some of these formulas as originally compiled the area of the bore was taken as one of the factors, in others the stroke was expressed in feet or decimal fractions thereof. For the sake of uniformity and to save work the formulas are altered so that the square of the bore is used and the stroke is expressed in inches.

TABLES OF HORSEPOWER FORMULAS

Four-cycle Engines

D = Diameter of cylinder in *inches*. L = Stroke of piston in *inches*. R = Revolutions per minute of crank shaft. n = Number of cylinders.

Authority for Formula	Factors Used	Constant or Divisor
Roberts. For gas.	$D^2 \times L \times R \times n$	19000
Roberts. For gasoline.	$D^2 \times L \times n \times R$	18000
A. L. A. M.	$D^2 \times n$	2.5

This formula is on a basis of 1000-ft. piston speed.

American Power Boat Association.*	$D^2 \times n$	$\frac{2.000}{0.7854} = 2.5338$
A. P. B. A.* for motors of less than 6 inches stroke.	$D^2 \times L \times n$	$\frac{1.000 \times 12}{.7854} = 15.20$

*The two formulas given above are for motors of boats rated as automobile boats. For others the rating should be taken as two-thirds of that given by these formulas. In case some device is used to force the charge into the cylinder 10 per cent. should be added to the ratings.

If an expansion or lower pressure-cylinder is used 20 per cent. of the square of the diameter of this cylinder or cylinders shall be added to the $D^2 \times n$ and divided by the regular constant.

(*Continued on page* 563)

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Two-cycle Engines

D = Diameter of cylinder in *inches*. L = Stroke of piston in *inches*. R = Revolutions per minute of crank shaft. n = Number of cylinders.

Authority for Formula	Factors Used	Constant or Divisor
Roberts. Gas.	$D^2 \times L \times R \times n$	14000
Roberts. Gasoline.	$D^2 \times L \times R \times n$	13500
American Power Boat Association.*	$D^2 \times n$	$\frac{1.65}{.7854} = 2.1008$
Same for less than 6 inches stroke.	$D^2 \times L \times n$	$\frac{12 \times .85}{\times .7854} = 12.987$

*The above are for automobile racing boat engines; for others the rating is taken as two-thirds of the above formulas. For engines having a displacer cylinder or cylinders the above rating is increased in the ratio that the displacer piston's displacement bears to that of the working cylinders.

INDICATED HORSEPOWER

On account of the great difficulty of securing good indicator cards at the high-piston and rotative speeds of automobile motors this is very little employed. The manograph which is employed for obtaining cards or diagrams from high-speed motors, as a general thing does not have an equal pressure scale and therefore does not readily lend itself to the accurate determination of I. H. P.

The indicated H. P. may of course be determined approximately by assuming a certain mechanical efficiency for the motor under consideration. This varies from as high as 90 per cent. in some cases to lower than 70 per cent. in others; the average would probably be not far from 80 per cent.

The formula for I. H. P., the bore and stroke being known as well as the R. P. M. and the mean effective pressure, is,

$$\frac{D^2 \times L \times R.P.M. \times n \times M.E.P.}{\frac{33,000. \times 12 \times 2}{.7854}} = I.H.P. \text{ (for 4-cycle).}$$

This constant equals 550,000 and the formula becomes $\frac{D^2 \times L \times n \times M.E.P. \times K.}{550,000.}$

The constant for 2-cycle is 275,000.

A formula which is given by Grover for the mean effective pressure, the compression being known, is as follows:

$$M.E.P. = {}_2C - 0.01\ C^2$$

C = Compression pressure above atmosphere in pounds per square inch.

This formula does not hold good for compression pressures over 100 pounds per square inch above atmosphere. Comparatively recent data seems to prove the reliability of this formula, also the fact, which Grover points out, that under favorable conditions, the values given by this formula may be slightly exceeded. Tests with higher pressures than 100 pounds show that the M. E. P. tends to remain at 100 pounds per square inch.

The compression pressure may be obtained by some form of gauge, the ignition for that cylinder being cut off, or in case the volume of the explosion chamber is known it may be obtained from the formula.

$PV^{1.3}$ = Constant. P being the absolute pressure.

V being taken in the one case as the volume of the combustion chamber and in the other as the above plus the piston displacement. P being in one case atmospheric pressure and in the other the absolute compression pressure. Of course for C in Grover's formula, the assumed atmospheric pressure should be subtracted from the result obtained by this formula.

Index to Tables and Data appears on Pages 27 to 30.

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APPROXIMATE HORSE-POWER OF FOUR-CYCLE AUTOMOBILE ENGINES*

TABLE OF CONSTANTS FOR VARIABLE SPEEDS AND STROKES

Stroke in Ins.	Revolutions per Minute of Motor														
	500	550	600	650	700	750	800	850	900	950	1,000	1,050	1,100	1,150	1,200
2.00.....	.089	.098	.107	.116	.124	.134	.142	.153	.161	.169	.178	.187	.196	.205	.214
2.25.....	.100	.110	.120	.130	.140	.151	.160	.171	.181	.190	.200	.210	.220	.231	.241
2.50.....	.112	.125	.133	.145	.156	.167	.176	.189	.201	.212	.223	.233	.245	.257	.268
2.75.....	.123	.135	.146	.159	.172	.184	.196	.208	.221	.233	.245	.256	.270	.282	.295
3.00.....	.134	.147	.160	.174	.187	.201	.214	.227	.241	.254	.267	.279	.294	.308	.322
3.25.....	.145	.158	.173	.188	.203	.219	.232	.246	.261	.275	.289	.303	.319	.333	.349
3.50.....	.156	.173	.186	.203	.218	.234	.250	.265	.281	.296	.312	.326	.343	.359	.375
3.75.....	.167	.184	.200	.218	.234	.252	.266	.284	.301	.317	.334	.349	.368	.385	.401
4.00.....	.178	.196	.214	.232	.249	.268	.285	.303	.321	.339	.356	.373	.392	.411	.429
4.25.....	.189	.208	.227	.246	.264	.285	.303	.322	.341	.360	.378	.396	.416	.436	456
4.50.....	.200	.220	.240	.261	.280	.305	.321	.341	.361	.381	.400	.419	.441	.461	.485
4.75.....	.212	.233	.253	.275	.295	.319	.339	.360	.381	.402	.423	.443	.466	.486	.509
5.00.....	.223	.245	.266	.290	.312	.335	.357	.379	.401	.423	445	.466	.491	.512	.530
5.25.....	.234	.257	.279	.304	.327	.351	.375	.398	.421	.444	.467	.490	.515	.538	.563
5.50.....	.245	.270	.293	.318	.343	.368	.393	.417	.441	.465	.489	.513	.540	.564	.590
5.75.....	.258	.282	.307	.332	.369	.385	.410	.436	.461	.486	.512	.536	.564	.589	.616
6.00.....	.268	.294	.320	.348	.375	.402	.428	.455	.481	.508	.535	.559	.589	.615	.643

Bore in Ins.	Square of Bore
2.00	4.00
2.25	5.06
2.50	6.25
2.75	7.55
3.00	9.00
3.25	10.56
3.50	12.25
3.75	14.05
4.00	16.00
4.25	18.05
4.50	20.20
4.75	22.55
5.00	25.00
5.25	27.50
5.50	30.20
5.75	33.05
6.00	36.00

Rule:—Multiply number to right of bore by number in upper table at intersection of proper R.P.M. and stroke columns.

Example:—Find approximate horsepower developed by motor having 4.25″ bore and 5″ stroke at 800 revolutions per minute. Under 4.25 bore we find 18.05.

At intersection of 5″ stroke line and 800 R.P.M. column in upper table we find .357.

The product of these numbers gives the horsepower, thus:

Approximate horsepower = 18.05 × .357 = 6.45 H.P.

These figures have been computed for the average M.E.P. as found in the ordinary motor car engine, but of course will vary with increase or decrease in compression and with different mechanical efficiencies.

*For multi-cylinder engines, multiply by number of cylinders. Above formula gives H. P. for only one cylinder.

Index to Tables and Data appears on Pages 27 to 30.

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BRAKE HORSEPOWER OF 2-CYCLE GASOLINE MOTORS

Determined by Tests of Marine Motors

HORSEPOWER OF 2 CYCLE ENGINES—ONE CYLINDER

	Bore and Stroke.	3 x 2½	3 x 3	3 x 3½	3 x 4	3½ x 3	3½ x 3½	3⅛ x 3¼
R.P.M...	300	.52	.62	.73	.83	.85	.99	.85
	400	.69	.83	.97	1.10	1.13	1.32	1.14
	500	.87	1.04	1.21	1.38	1.41	1.65	1.42
	600	1.04	1.25	1.45	1.66	1.70	1.97	1.71
	700	1.21	1.45	1.70	1.93	2.00	2.30	2.00
	800	1.38	1.65	1.94	2.20	2.26	2.62	2.28
	900	1.55	1.87	2.20	2.50	2.55	2.96	2.56
	1000	1.75	2.10	2.40	2.76	2.84	3.30	2.90
		4 x 3	3¾ x 3½	4 x 3½	3¾ x 4	3¾ x 3¾	4 x 4	4¼ x 4
R.P.M...	300	1.10	1.14	1.28	1.30	1.22	1.48	1.67
	400	1.47	1.50	1.72	1.73	1.62	1.97	2.22
	500	1.84	1.90	2.15	2.16	2.00	2.46	2.78
	600	2.20	2.30	2.58	2.60	2.44	2.94	3.34
	700	2.58	2.65	3.00	3.00	2.84	3.44	3.89
	800	2.94	3.00	3.42	3.45	3.24	3.92	4.45
	900	3.30	3.40	3.86	3.88	3.65	4.45	5.00
	1000	3.70	3.80	4.30	4.40	4.05	4.92	5.55
		4¼ x 4¼	4¾ x 4	4 x 5	4¼ x 4½	4½ x 4½	4½ x5	4½ x 5½
R.P.M...	300	1.77	2.08	1.85	1.87	2.10	2.34	2.58
	400	2.36	2.78	2.46	2.50	2.80	3.12	3.42
	500	2.95	3.46	3.07	3.12	3.50	3.90	4.30
	600	3.54	4.15	3.70	3.75	4.20	4.68	5.15
	700	4.13	4.85	4.30	4.37	4.90	5.45	6.00
	800	4.70	5.55	4.93	5.00	5.60	6.25	6.90
	900	5.30	6.20	5.50	5.60	6.30	7.00	7.70
	1000	5.90	6.90	6.15	6.25	7.00	7.80	8.60
		4¾ x 5	5 x 5	5 x 5¼	5 x 6	5¼ x 5½	5½ x 5	5¾ x 5
R.P.M...	300	2.60	2.88	3.00	3.46	3.44	3.50	3.80
	400	3.48	3.82	4.00	4.60	4.57	4.65	5.10
	500	4.35	4.80	5.05	5.75	5.70	5.80	6.35
	600	5.20	5.75	6.10	6.90	6.85	7.00	7.60
	700	6.10	6.70	7.05	8.05	8.15	8.15	8.90
	800	6.95	7.65	8.10	9.25	9.30	9.30	10.30
	900	7.80	8.65	9.20	....	10.50	10.50	11.40
	1000	8.70	9.60	10.00	....	....	11.60	12.70
		5½ x 5½	5½ x 6¼	5½ x 6½	6 x 6	6½ x 6½	6 x 7	
R.P.M...	300	3.84	4.35	4.50	4.95	6.30	5.80	....
	400	5.10	5.82	6.00	6.60	8.40	7.75	....
	500	6.40	7.25	7.60	8.30	10.50	9.70	....
	600	7.67	8.75	9.25	9.95	12.60	11.60	....
	700	9.00	10.20	10.60	11.60	14.70	13.50	....
	800	10.25	11.60	....	....	....	....	....
	900	11.50	....	....	....	....	....	....
	1000	....	....	....	....	....	....	....

Index to Tables and Data appears on Pages 27 to 30.

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O'GORMAN'S HORSE-POWER REFERENCE TABLE

HORSE-POWER FROM BORE AND STROKE—FORMULA $KD^{1.6}S^{4}$

To find the comparative horse-power number of a car, find the bore in mm. given in the extreme left-hand column and follow the horizontal line till you reach the column vertically below the stroke in mm. Thus, if the bore is 101.5 mm. and the stroke 114 mm. the horse-power number is 30.9. This is not the maximum power, but a representative figure for power.

Bore in MM.	Stroke in Millimetres															Bore in Inches
	55	57	60	63.5	65	70	75	76	80	82.5	85	89	90	95.2	100	
55	8.6	8.8	9	9.2	9.3	9.5	9.8	9.8	10	10.2	10.3	10.5	10.0	10.8	11	2 5/32
57	9.25	9.3	9.5	9.8	9.9	10.2	10.5	10.5	10.75	10.8	11	11.1	11.2	11.5	11.75	2 1/4
63.5	11	11.1	11.25	11.5	11.5	12	12.3	12.4	12.6	12.8	13	13.2	13.25	13.5	13.8	2 1/2
65	11.2	11.3	11.6	11.8	12	12.3	12.7	12.8	13	13.2	13.4	13.6	13.7	14.0	14.3	2 9/16
70	12.75	12.9	13.2	13.4	13.5	14	14.5	14.5	14.75	14.9	15.2	15.4	15.5	15.8	16	2 3/4
75	14.2	14.3	14.6	15	15.1	15.5	16	16.1	16.5	16.7	16.9	17.2	17.3	17.7	18.1	2 15/16
76	14.5	14.8	15	15.4	15.5	16	16.5	16.6	17	17.1	17.4	17.7	17.75	18.2	18.5	3
80	15.7	16	16.2	16.6	16.8	17.3	17.8	17.9	18.3	18.5	18.8	19.1	19.2	19.6	20	3 9/64
82.5	16.4	16.6	17	17.3	17.5	18	18.6	18.7	19	19.3	19.5	19.9	20	20.5	20.8	3 1/4
89	18.7	18.9	19.3	19.7	20	20.5	21	21.2	21.6	21.9	22.2	22.6	22.7	23.2	23.7	3 1/2
90	19.1	19.3	19.7	20.2	20.25	21	21.6	21.7	22.1	22.4	22.7	23.1	23.3	23.8	24.3	3 17/32
95.2	20.9	21.1	21.6	22	22.25	22.9	23.55	23.7	24.2	24.5	24.75	25.2	25.4	25.9	26.4	3 3/4
100	22.5	22.8	23.2	23.8	24	24.7	25.5	25.6	26.2	26.5	26.9	27.3	27.4	28	28.6	3 15/16
101.5	23	23.4	23.9	24.4	24.6	25.4	26	26.2	26.75	27.1	27.5	27.9	28	28.66	29.25	4
105	24.5	24.9	25.3	26	26.2	27	27.9	28	28.6	28.9	29.3	29.8	30	30.6	31.3	4 1/8
108	25.25	25.6	26.2	26.8	27.2	28	28.8	29	29.6	29.9	30.3	30.8	31	31.66	32.3	4 1/4
114.5	.....	.....	.....	29.7	29.8	30.6	31.5	31.6	32.25	32.6	33	33.6	33.8	34.5	35.3	4 1/2
115	28.3	28.8	29.3	30.3	30.3	31.2	32.1	32.3	32.9	33.3	33.7	34.3	34.5	35.2	36	4 17/32
120	30.4	30.7	31.3	32.3	32.8	33.2	34	34.3	35	35.4	35.9	36.5	36.7	37.5	38.3	4 3/4
125	31.8	32.2	32.8	34	34	35	36	36.2	36.9	37.4	37.8	38.5	38.7	39.6	40.4	4 15/16
127	33.2	33.5	34.3	35.2	35.3	36.3	37.3	37.6	38.3	38.8	39.25	40.0	40.2	41	41.8	5
130	34.1	34.6	35.2	36.4	36.4	37.5	38.6	38.8	39.5	40	40.5	41.1	41.3	42.3	43.2	5 1/8
		2 1/4		2 1/2		2 3/4		3		3 1/4		3 1/2		3 3/4		
	Stroke in Inches															

Bore in MM.	Stroke in Millimetres															Bore in Inches
	101.5	105	108	110	114	115	120	125	127	130	133	135	139	140	145	
55	11.1	11.2	11.3	11.4	11.6	11.7	11.8	12	12.1	12.2	12.3	....	.....	.....	.....	2 5/32
57	11.7	12	12	12.2	12.3	12.4	12.5	12.75	12.8	13	13.1	....	.....	.....	.....	2 1/4
63.5	13.9	14.1	14.2	14.4	14.5	14.6	14.8	15	15.2	15.4	15.5	....	.....	.....	.....	2 1/2
65	14.4	14.6	14.8	14.9	15.2	15.3	15.5	15.7	15.8	15.9	16.1	....	.....	.....	.....	2 9/16
70	16.2	16.5	16.6	16.75	17	17	17.4	17.6	17.7	18	18.1	....	.....	.....	.....	2 3/4
75	18.2	18.4	18.6	18.8	19	19.1	19.4	19.7	19.8	20	20.2	....	.....	.....	.....	2 15/16
76	18.6	18.9	19.1	19.2	19.4	19.5	19.85	20.2	20.3	20.5	20.7	....	.....	.....	.....	3
80	20.0	20.4	20.6	20.8	21	21.2	21.5	21.8	21.9	22.2	22.4	....	.....	.....	.....	3 9/64
82.5	20.9	21.2	21.4	21.6	21.9	22	22.35	22.7	22.8	23.0	23.3	....	.....	.....	.....	3 1/4
89	23.8	24.1	24.4	24.55	24.9	25	25.4	25.8	26	26.2	26.5	....	.....	.....	.....	3 1/2
90	24.4	24.7	25	25.2	25.5	25.6	26.0	26.5	26.6	26.9	27.2	....	.....	.....	.....	3 17/32
95.2	26.6	26.9	27.2	27.45	27.9	28	28.4	28.9	29.0	29.4	29.7	....	.....	.....	.....	3 3/4
100	28.8	29.2	29.4	29.7	30	30.2	30.8	31.2	31.4	31.7	31.9	....	.....	.....	.....	3 15/16
101.5	29.4	29.85	30.2	30.4	30.9	31	31.5	32	32.2	32.6	32.9	33	33.5	33.5	34	4
105	31.4	31.4	32.2	32.5	33	33.1	33.7	34.2	34.4	34.8	35.1	35.2	35.8	35.9	36.3	4 1/8
108	32.5	33	33.3	33.5	34	34.2	34.75	35.3	35.5	35.9	36.2	36.4	36.8	37	37.5	4 1/4
114.5	35.5	36	36.3	36.6	37.2	37.3	37.9	38.6	38.8	39.2	39.6	39.8	40.3	40.4	41	4 1/2
115	36.1	36.1	37	37.4	37.9	38	38.7	39.3	39.5	39.9	40.3	40.5	41.1	41.2	41.8	4 17/32
120	38.5	39	39.5	39.8	40.4	40.6	41.3	42	42.2	42.7	43	43.3	44	44	44.6	4 3/4
125	40.6	41.2	41.6	42	42.5	42.7	43.5	44.2	44.4	44.8	45.3	45.4	46.1	46.3	46.9	4 15/16
127	42.0	42.7	43.1	43.5	44.0	44.25	45	45.75	46	46.5	46.9	47.2	47.8	48	48.6	5
130	43.4	44	44.5	45	45.5	45.7	46.5	47.3	47.5	48	48.5	48.7	49.4	49.6	50.2	5 1/8
	4		4 1/4		4 1/2		4 3/4		5		5 1/4		5 1/2			
	Stroke in Inches															

(Table continued on page 567

Index to Tables and Data appears on Pages 27 to 30.

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O'GORMAN'S HORSE-POWER TABLE (Continued)

Bore in MM.	Stroke in Millimetres															Bore in Inches
	146	150	152	155	158	160	165	170	171	175	178	180	184	185	190	
55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 5/32
57	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 1/4
63.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 1/2
65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 9/16
70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 3/4
75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 15/16
76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 9/64
82.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 1/4
89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 1/2
90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 17/32
95.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 3/4
100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 15/16
101.5	34.1	34.5	34.7	35	35.2	35.4	35.8	36.2	36.3	36.7	36.9	37	.....	37.4	.....	4
105	36.4	36.8	37	37.3	37.5	37.7	38	38.5	38.6	38.9	39.1	39.3	.....	39.6	.....	4 1/8
108	37.6	38	38.2	38.5	38.8	39	39.5	39.9	40	40.4	40.6	40.8	.....	41.2	.....	4 1/4
114.5	41.2	41.5	41.8	42	42.5	42.6	43.2	43.7	43.8	44	44.4	44.6	.....	45	.....	4 1/2
115	41.9	42.3	42.6	43	43.4	43.6	44	44.6	44.7	45.1	45.3	45.5	.....	45.9	.....	4 17/32
120	44.7	45.2	45.5	45.8	46.2	46.4	47	47.5	47.6	48	48.3	48.6	.....	49	.....	4 3/4
125	47	47.5	47.9	48.3	48.7	48.9	49.5	50.1	50.2	50.6	50.9	51.2	.....	51.6	.....	4 15/16
127	48.7	49.3	49.5	50	50.4	50.5	51.2	51.8	52	52.4	52.8	53	.....	53.5	.....	5
130	50.2	50.8	51.2	51.6	52	52.2	52.8	53.5	53.6	54.2	54.4	54.7	.....	55.2	.....	5 1/8
	5 3/4		6		6 1/4		6 1/2		6 3/4		7			7 1/4	7 1/2	
	Stroke in Inches															

A. L. A. M. STANDARD HORSE-POWER FORMULA

(Bore of Cylinder Squared x No. of Cylinders, ÷ 2.5)

Bore		Horse Power			
Inches	Mill	1 Cyl.	2 Cyl.	4 Cyl.	6 Cyl.
2 1/2	64	2 1/2	5	10	15
2 5/8	68	2 3/4	5 1/2	11	16 1/2
2 3/4	70	3	6	12 1/10	18 1/8
2 7/8	73	3 5/16	6 5/8	13 1/4	19 7/8
3	76	3 3/5	7 1/5	14 2/5	21 3/5
3 1/8	79	3 15/16	7 13/16	15 5/8	23 7/16
3 1/4	83	4 1/4	8 1/2	16 9/10	25 3/5
3 3/8	85	4 9/16	9 1/8	18 1/4	27 3/8
3 1/2	89	4 9/10	9 4/5	19 3/5	29 3/5
3 5/8	92	5 1/4	10 1/2	20 1/4	31 3/5
3 3/4	95	5 5/8	11 1/4	22 1/2	33 3/4
3 7/8	99	6	12	24	36 1/16
4	102	6 2/5	12 4/5	25 3/5	38 2/5
4 1/8	105	6 13/16	13 5/8	27 1/4	40 9/10
4 1/4	108	7 1/4	14 1/2	28 9/10	43 1/5
4 3/8	111	7 5/8	15 5/16	30 5/8	45 15/16
4 1/2	114	8 1/10	16 1/5	32 2/5	48 3/5
4 5/8	118	8 9/16	17 1/8	34 1/4	51 3/8
4 3/4	121	9	18	36 1/10	54 1/10
4 7/8	124	9 1/2	19	38	57
5	127	10	20	40	60
5 1/8	130	10 1/2	21	42	63
5 1/4	133	11	22	44 1/10	66 1/5
5 3/8	137	11 9/16	23	46	69 1/10
5 1/2	140	12 1/10	24 1/5	48 2/5	72 3/5
5 5/8	143	12 5/8	25 5/16	50 5/8	75 15/16
5 3/4	146	13 1/4	26 1/2	53	79 1/2
5 7/8	149	13 13/16	27 5/8	55 1/4	82 9/10
6	152	14 2/5	28 4/5	57 3/5	86 2/5

Computed at 1,000 feet per minute piston speed.

Index to Tables and Data appears on Pages 27 to 30.

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MEAN EFFECTIVE PRESSURES

In standard modern vehicle motors the mean effective pressure is about 5 kilograms per square centimeter (71 pounds per square inch). This pressure has increased since the beginning of the automobile industry but in a lesser proportion than the speed. It varies with the size of the motor. Thus, in a current type of motor with 60x120 mm. cylinders (2.4x4.8 inches), it attains 4 kilograms (57 pounds per square inch). In a motor of 80x130 mm. (3.2x5.2 in.) it is about 5 kilograms (71 pounds per square inch), and in a motor of 110x140 mm. (4.4x5.6 inches) it is about 6 kilograms (85 pounds), all other things being equal. This at 1,000 revolutions per minute.

The mean effective pressure increases as the result of increased compression. It decreases as the number of revolutions per minute increases.

The thermal efficiency of a motor, by which is understood the ratio between the work done and the thermal energy contained in the fuel consumed, is in the neighborhood of 14 to 15 per cent., corresponding to a fuel consumption of one-eighth of a gallon per horse-power hour. The mechanical efficiency, by which is understood the ratio between the work actually done to the energy expended on the piston by the expanding gases, is approximately 70 per cent. The efficiency of transmission, that is, the ratio of the work done at the wheel rims to that delivered at the crank shaft, is generally taken as 75 per cent.—Translated from "La Locomotion," by "*The Horseless Age*."

MEAN EFFECTIVE PRESSURES

DISREGARDING MECHANICAL LOSSES

Make	Cylinders	Horse-power	Revolutions per Minute	Mean Effective Pressure
Daimler	Four 124x130 mm	58.0	1,172	106.8
National	Four 5x5 11/16 in.	64.0	1,400	81.1
National	Four 5x5 11/16 in.	54.1	1,055	90.9
Pierce	Six 4x4¾ in.	44.5	1,263	76.1
Pierce	Six 4x4¾ in.	30.9	800	85.4
Rambler	Four 5x5½ in.	43.5	1,091	73.1
Rambler	Four 5x5½ in.	40.0	900	81.3
Rambler	Four 4½x4½ in.	34.0	1,333	72.2
Rambler	Four 4½x4½ in.	29.0	900	89.2
Thomas	Six 4¼x5½ in.	49.0	1,091	76.0
Thomas	Six 4¼x5½ in.	34.5	700	83.4

*Fitted with Knight-Daimler sleeve valve engine.

SEQUENCE OF FIRING OF VARIOUS AMERICAN SIX-CYLINDER AUTOMOBILE MOTORS

Pierce-Arrow	fires	1-5-3-6-2-4
Winton	"	1-5-3-6-2-4
Lozier	"	1-2-3-6-5-4
Peerless	"	1-3-2-6-4-5
Matheson	"	1-4-2-6-3-5
Stevens-Duryea	"	1-4-2-6-3-5
Knox	"	1-5-3-6-2-4
Alco	"	1-4-2-6-3-5
Thomas (K)	"	1-4-2-6-3-5
Thomas (L)	"	1-3-5-6-4-2
Franklin	"	1-4-2-6-3-5

Index to Tables and Data appears on Pages 27 to 30.

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TOLERANCE TABLE FOR RADIAL BALL BEARINGS

BORE

M.M. Diam.	M.M.	M.M.
6 to 10,5	+0	−0,008
11 to 18	+0	−0,01
19 to 30	+0	−0,012
31 to 48	+0	−0,014
49 to 75	+0	−0,016
76 to 115	+0	−0,018
116 to 175	+0	−0,02
176 to 400	+0	−0,025

OUTSIDE

M.M. Diam.	M.M.	M.M.
6 to 10,5	+0	−0,003
11 to 18	+0	−0,004
19 to 30	+0	−0,005
31 to 48	+0	−0,006
49 to 75	+0	−0,008
76 to 115	+0	−0,01
116 to 175	+0	−0,012
176 to 265	+0	−0,015
266 to 400	+0	−0,02

WIDTH

+0,01 M.M. −0,01

VARIATION OF VOLUME AND TEMPERATURE WITH COMPRESSION

Gauge Pressure	Volume	Temperature
0	1.000	60
2	.910	80.4
5	.810	106
10	.690	145
20	.543	207
30	.454	252
40	.393	302
50	.350	339
75	.276	420
100	.232	485
115	.213	518
130	.197	550
145	.184	580
160	.172	607
175	.163	632
200	.149	672

The foregoing table is based on the assumption that no heat is added or subtracted.

Index to Tables and Data appears on Pages 27 to 30.

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TABLE OF CRANK ANGLES AND CORRESPONDING PISTON POSITIONS

Out denotes the stroke towards the crankshaft.
In denotes the stroke away from the crankshaft.

Crank Angles in Degrees	Connecting Rod to Crank Ratio = 4		Connecting Rod to Crank Ratio = 4.5		Connecting Rod to Crank Ratio = 5	
	Out	In	Out	In	Out	In
2	.0004	.0002	.0004	.0003	.0004	.0003
4	.0015	.0010	.0015	.0010	.0015	.0010
6	.0034	.0021	.0033	.0021	.0033	.0022
8	.0061	.0036	.0060	.0038	.0058	.0039
10	.0095	.0057	.0092	.0059	.0091	.0061
12	.0136	.0082	.0133	.0087	.0131	.0088
14	.0185	.0112	.0181	.0116	.0178	.0119
16	.0241	.0146	.0236	.0152	.0232	.0156
18	.0304	.0185	.0298	.0192	.0293	.0197
20	.0375	.0228	.0367	.0237	.0360	.0243
22	.0452	.0276	.0442	.0286	.0434	.0294
24	.0536	.0329	.0524	.0340	.0515	.0349
26	.0627	.0385	.0613	.0399	.0602	.0410
28	.0724	.0447	.0708	.0462	.0696	.0475
30	.0827	.0513	.0809	.0531	.0796	.0545
32	.0936	.0583	.0916	.0603	.0901	.0619
34	.1051	.0658	.1029	.0680	.1012	.0698
36	.1172	.0738	.1147	.0762	.1128	.0782
38	.1298	.0822	.1271	.0848	.1250	.0870
40	.1430	.6910	.1400	.0939	.1377	.0962
42	.1565	.1002	.1534	.1034	.1509	.1059
44	.1707	.1099	.1673	.1134	.1646	.1161
46	.1853	.1201	.1816	.1237	.1787	.1267
48	.2003	.1306	.1963	.1345	.1392	.1377
50	.2156	.1416	.2115	.1458	.2081	.1491
52	.2314	.1530	.2270	.1574	.2234	.1609
54	.2474	.1648	.2428	.1695	.2391	.1732
56	.2638	.1769	.2589	.1819	.2550	.1858
58	.2805	.1896	.2754	.1947	.2713	.1988
60	.2974	.2026	.2920	.2079	.2878	.2122
62	.3146	.2159	.3090	.2215	.3046	.2260
64	.3320	.2297	.3262	.2355	.3215	.2401
66	.3495	.2438	.3435	.2498	.3387	.2545
68	.3672	.2582	.3610	.2644	.3561	.2693
70	.3850	.2730	.3786	.2794	.3735	.2844
72	.4028	.2881	.3963	.2947	.3911	.2998
74	.4208	.3036	.4141	.3103	.4088	.3155
76	.4388	.3193	.4319	.3261	.4266	.3315
78	.4568	.3353	.4498	.3422	.4444	.3477
80	.4747	.3516	.4677	.3586	.4622	.3642
82	.4927	.3682	.4857	.3753	.4799	.3809
84	.5105	.3849	.5034	.3921	.4977	.3978
86	.5283	.4019	.5211	.4091	.5154	.4149
88	.5460	.4191	.5388	.4263	.5330	.4321
90	.5635	.4365	.5563	.4437	.5505	.4495
92	.5802	.4540	.5737	.4612	.5670	.4670
94	.5981	.4787	.5909	.4789	.5851	.4846
96	.6151	.4895	.6079	.4966	.6022	.5028
98	.6318	.5073	.6247	.5143	.6191	.5201
100	.6484	.5253	.6414	.5323	.6358	.5378
102	.6647	.5432	.6578	.5502	.6523	.5556
104	.6807	.5612	.6739	.5681	.6685	.5734
106	.6964	.5792	.6897	.5859	.6845	.5912
108	.7119	.5972	.7053	.6037	.7002	.6082
110	.7270	.6150	.7206	.6214	.7156	.6265
112	.7418	.6328	.7356	.6390	.7307	.6439
114	.7562	.6505	.7502	.6565	.7455	.6613

(*Continued on page* 571)

Index to Tables and Data appears on Pages 27 to 30.

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Crank Angles in Degrees	Connecting Rod to Crank Ratio=4		Connecting Rod to Crank Ratio=4.5		Connecting Rod to Crank Ratio=5	
	Out	In	Out	In	Out	In
116	.7703	.6680	.7645	.6738	.7599	.6785
118	.7841	.6854	.7785	.6910	.7740	.6954
120	.7974	.7026	.7921	.7080	.7878	.7122
122	.8104	.7195	.8053	.7246	.8012	.7287
124	.8230	.7362	.8181	.7411	.8142	.7450
126	.8352	.7526	.8305	.7572	.8268	.7609
128	.8470	.7686	.8426	.7730	.8391	.7766
130	.8584	.7844	.8542	.7885	.8509	.7919
132	.8694	.7997	.8655	.8037	.8623	.8068
134	.8799	.8147	.8763	.8184	.8733	.8213
136	.8901	.8293	.8866	.8327	.8839	.8354
138	.8998	.8434	.8966	.8466	.8941	.8491
140	.9090	.8570	.9061	.8600	.9038	.8623
142	.9178	.8702	.9152	.8729	.9130	.8750
144	.9262	.8828	.9238	.8853	.9218	.8872
146	.9342	.8949	.9320	.8971	.9302	.8988
148	.9417	.9064	.9397	.9084	.9381	.9099
150	.9487	.9173	.9469	.9191	.9455	.9204
152	.9553	.9276	.9538	.9292	.9525	.9304
154	.9617	.9373	.9601	.9387	.9590	.9398
156	.9671	.9464	.9660	.9476	.9651	.9485
158	.9724	.9548	.9714	.9558	.9706	.9566
160	.9772	.9625	.9763	.9633	.9757	.9640
162	.9815	.9696	.9806	.9702	.9803	.9707
164	.9854	.9759	.9848	.9764	.9844	.9767
166	.9888	.9815	.9884	.9819	.9881	.9822
168	.9918	.9864	.9913	.9867	.9912	.9869
170	.9943	.9905	.9941	.9908	.9939	.9909
172	.9963	.9939	.9962	.9940	.9961	.9942
174	.9979	.9966	.9979	.9967	.9978	.9967
176	.9990	.9985	.9990	.9985	.9990	.9985
178	.9998	.9996	.9997	.9996	.9097	.9996
180	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

This table should be useful for engine timing and for port design in two-cycle engines. The quantities are expressed in fractions of the stroke.

RACING OF MOTOR AT HIGH SPEEDS

Experiments were conducted by S. F. Edge at the Brooklands (England) track to determine whether the motor of an automobile "races" through the road (driving) wheels leaving the ground on rough roads and at high speeds. A Napier car was used. With high gear engaged, the car was towed a complete lap of the Brooklands track, a distance of approximately 2⅝ miles, and the number of revolutions of the motor was found to be 3,372. Towing was effected following the 50-foot line of the track and the subsequent tests of the car under its own power were made on or about this line. Following is a tabulated result of the several tests:

Test	Distance (about 2⅝ miles)	Speed in Miles per Hour	Engine Revolutions	Total Slip (in Engine Revs.)
1	1 lap 2⅝ miles	Car towed	3,732	
2	1 lap 2⅝ miles	Driven very slow speed	3,748	16
3	1 lap 2⅝ miles	Driven 20	3,776	44
4	1 lap 2⅝ miles	Driven 30	3,772	40
5	1 lap 2⅝ miles	Driven 40	3,770	38
6	1 lap 2⅝ miles	Driven 50	3,780	58
7	1 lap 2⅝ miles	Driven 60	3,804	72

Index to Tables and Data appears on Pages 27 to 30.

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WIND RESISTANCE

Dating back to the time of Smeaton various formulas have been used for determining the relation between wind pressure and velocity as affecting the stability of buildings and other exposed structures. Smeaton's table, which is largely used at the present day, is as follows:

Miles per Hour	Feet per Second	Pressure per sq. ft. in Pounds	Wind Called
1	1.47	0.005	Hardly perceptible.
2	2.93	0.020	Just perceptible.
3	4.4	0.044	
4	5.87	0.079	Gentle pleasant wind.
5	7.33	0.123	
6	8.8	0.177	
7	10.25	0.241	
8	11.75	0.315	Pleasant brisk gale.
9	13.2	0.400	
10	14.67	0.492	
12	17.6	0.708	
14	20.5	0.964	
15	22.00	1.107	
16	23.45	1.25	
18	26.4	1.55	Very brisk.
20	29.34	1.968	
25	36.67	3.075	
30	44.01	4.429	High wind.
35	51.34	6.027	
40	58.68	7.873	Very high storm
45	66.01	9.963	
50	73.35	12.30	
55	80.7	14.9	
60	88.02	17.71	Great storm.
66	95.4	20.85	
70	102.5	24.1	
75	110.	27.7	Hurricane.
80	117.36	31.49	
100	146.67	49.2	Immense hurricane.

The foregoing table is applicable to automobile work assuming that the machine is moving in still air at the varying rates of speed given in miles per hour. It is generally admitted that the Smeaton formula gives results too high. The formula is $P=0.005\ V^2$. Other and more recent formulas are those of Martin, $P=0.004\ V^2$, and Dines, $P=0.0029\ V^2$. At a rate of speed of 60 miles an hour these formulas give the following results in pounds per square foot: Smeaton, 18; Martin, 14.4; Dines, 10.44.

In the case of pleasure cars the wind resistance at ordinary rates of speed is so low that it does not greatly influence design while in the case of racing machines many ingenious forms of construction have been tried out with a view to the reduction of the loss from this source.

POWER REQUIRED TO OVERCOME WIND RESISTANCE (FORREST JONES)

A formula for use in approximating the power required to overcome wind resistance is given as follows:

$$HP=\frac{PA\ (M\ 5{,}280\ |\ 60)}{33{,}000}=0.00267\ PAM$$

In which HP = Horsepower required to overcome wind resistance
P = Pressure of wind in pounds per square foot.
A = Front area of body in square feet.
M = Speed of car in miles per hour.

Numerical example:

Assuming a car with a front area of 10 square feet and a speed of 60 miles per hour, the power required to overcome this wind resistance will be:

$$HP=\frac{13\times 10\ (60\times 5{,}280\ |\ 60)}{33{,}000}=20.8$$

It is not believed that this formula will hold out for all ranges in speed, nor can it be said with certainty that the front area total will be correctly stated if the areas of all the parts without respect to shape or location are figured in on the same basis. In all probability, the most certain way to ascertain the amount of power required to overcome wind resistance is to take a certain car and with suitable instrument under road conditions measure the power required

Index to Tables and Data appears on Pages 27 to 30.

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DIMENSIONS AND LIFT OF POPPET VALVES FOR A GIVEN SIZE OF OPENING

D = Smaller diameter of valve seat.
d = diameter of piping to which valve opening must correspond.

$$r = \frac{D}{d}$$

FLAT-SEATED VALVES.

For $r = 1$ Lift $= d \times 0.250 = D \times 0.250$.
" $r = 1.25$ " $= d \times 0.200 = D \times 0.160$.
" $r = 1.5$ " $= d \times 0.166 = D \times 0.111$.
" $r = 2$ " $= d \times 0.125 = D \times 0.162$.
" $r = 2.5$ " $= d \times 0.100 = D \times 0.040$.

CONE-SEATED VALVES; 45° ANGLE OF CONE.

For $r = 1$ Lift $= d \times 0.307 = D \times 0.307$.
" $r = 1.25$ " $= d \times 0.256 = D \times 0.205$.
" $r = 1.5$ " $= d \times 0.219 = D \times 0.146$.
" $r = 2$ " $= d \times 0.170 = D \times 0.084$.
" $r = 2.5$ " $= d \times 0.138 = D \times 0.055$.

It will be noted that cone-seated valves require a lift from one-fifth to one-quarter greater than the corresponding flat-seated valves.

The proportions of lift given in connection with flat-seated valves are geometrically correct. It should, however, be borne in mind that flat-seated valves generally introduce a certain amount of wire drawing of the incoming charge. A slight increase over the theoretically correct lifts should consequently be provided. A definite coefficient cannot be given, as this will depend considerably upon the valve seat and valve chest design as well as upon the proportions of the fillet between valve stem and valve head. The matter is one of personal intuition by the designer; in the best French designs the extra allowance seldom exceeds 25 per cent. of the theoretical lift. It is well to so arrange the contour of the valve and valve chamber profiles that a minimum of lift be required, as this is favorable to silence in running and to flexibility.

FORMULA FOR PISTON VELOCITY

The ratio of connecting rod length to stroke influences the velocity of the piston and the following will hold: Let,

l = eccentricity of crank (half the stroke);
L = length of connecting rod;
v = linear velocity of crank-pin;
θ = crank angle;
S = piston velocity in feet per minute:
r = ratio;

when,

$$r = \frac{l}{L}$$

and,

$$S = v(\sin\theta \times l/2a \sin 2\theta)$$

In the above expression for the piston velocity, all terms higher than 2θ are neglected because of their small value, which affects the result little, and only makes the formula cumbersome.

Index to Tables and Data appears on Pages 27 to 30.

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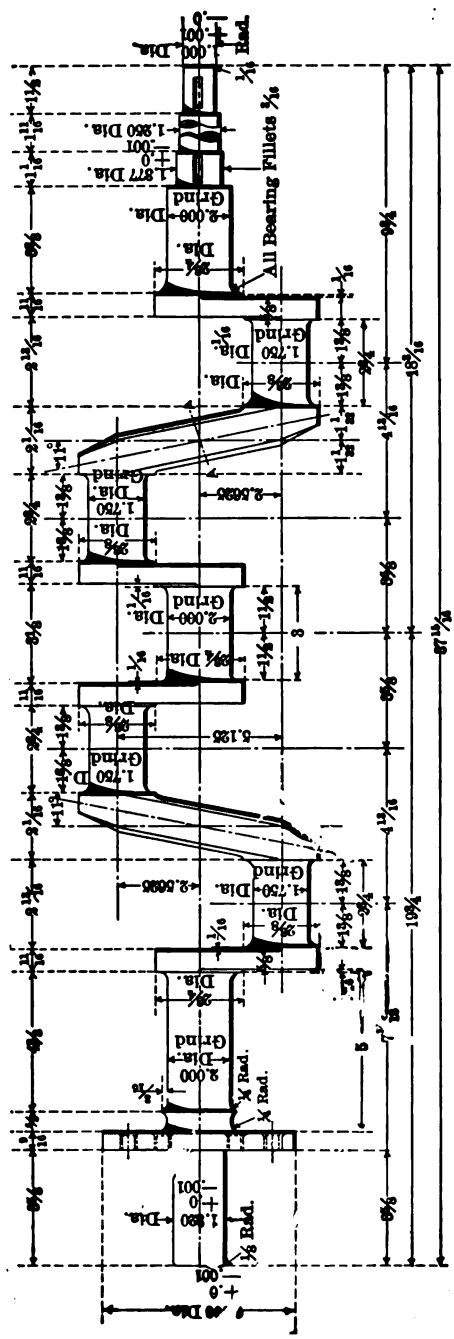
COMPLETELY DIMENSIONED DRAWING OF TYPICAL FOUR-THROW AUTOMOBILE MOTOR CRANK SHAFT



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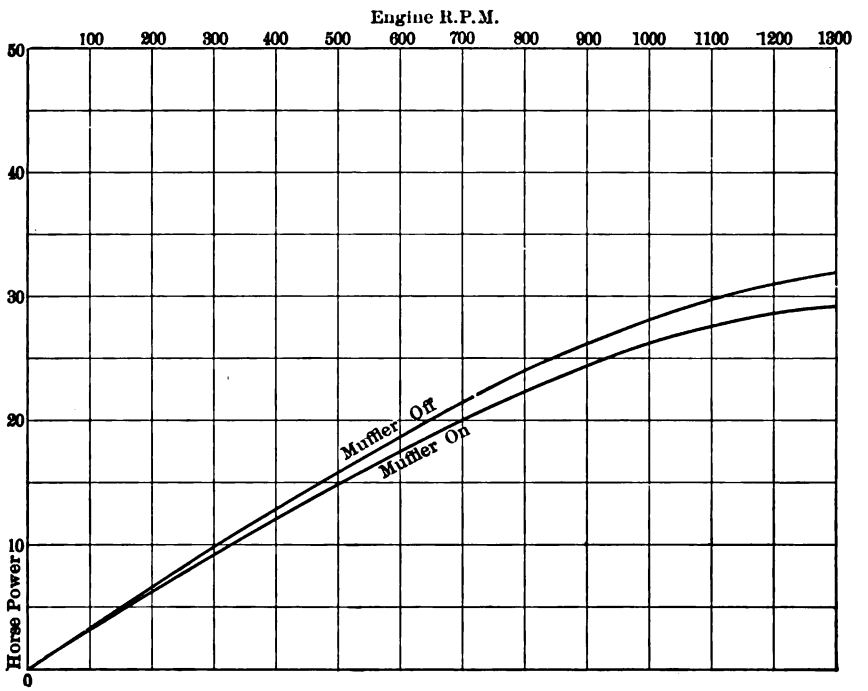
POWER LOSS DUE TO USE OF MUFFLER ON FOUR-CYLINDER AUTOMOBILE MOTCR

TEST CONDUCTED BY RAMBLER TESTING LABORATORY

Engine R.P.M.	Test No. 724 Horse Power Muffler	Test No. 724 Horse Power No Muffler	Test No. 724 Loss	Test No. 730 Horse Power Muffler	Test No. 730 Horse Power No Muffler	Test No. 730 Loss
600	17.6	18.9	1.3	17.4	18.6	1.2
700	20.0	21.5	1.5	19.8	21.2	1.4
800	22.3	24.0	1.7	22.1	23.8	1.7
900	24.3	26.2	1.9	24.3	26.1	1.8
1,000	26.1	28.1	2.0	26.1	28.1	1.9
1,100	27.5	29.7	2.2	27.6	29.7	2.1
1,200	28.6	30.9	2.3	28.6	30.8	2.2
1,300	29.3	31.8	2.5	29.2	31.6	2.4



Index to Tables and Data appears on Pages 27 to 30.

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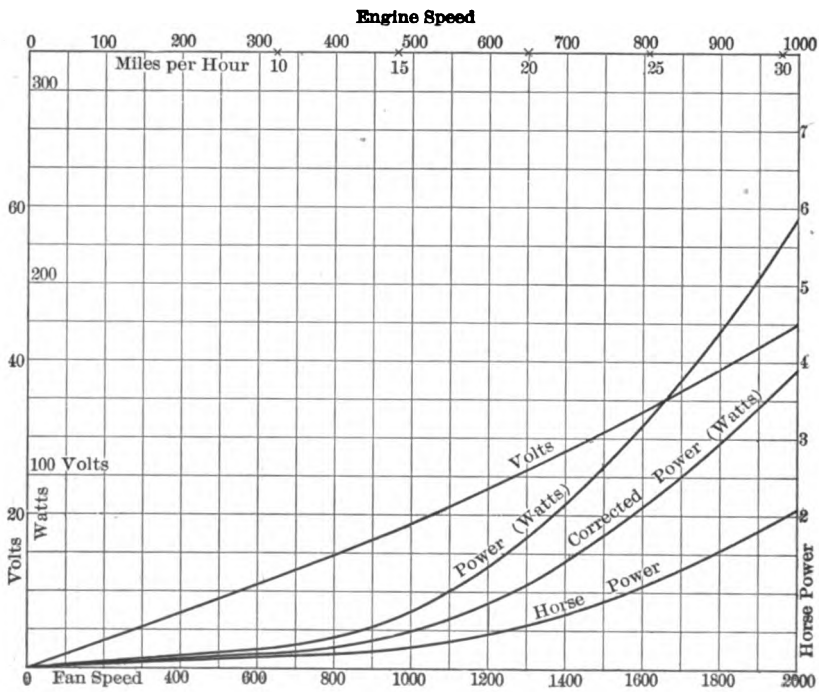
POWER CONSUMPTION TEST OF FOUR-CYLINDER AUTOMOBILE MOTOR COOLING FAN

CONDUCTED BY RAMBLER TESTING LABORATORY

Car Speed	R.P.M.		Power	R.P.M.	Corrected Power Curve		
M.P.H.	Engine	Fan	Watts	Correction	Net R.P.M.	Watts	H.P.
5	162	324	5	40	284	40	.00536
10	324	648	9	81	567	80	.0107
15	486	972	28	130	842	17.5	.0235
20	648	1,296	68	178	1,122	43.0	.0576
25	810	1,620	133	215	1,405	87.5	.117
30	972	1,944	224	270	1,674	146.0	.195

Fan run by separately excited motor.



Index to Tables and Data appears on Pages 27 to 30.

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TRANSMISSION EFFICIENCY OF DIFFERENT TYPES OF MECHANISM (WORBY BEAUMONT)

Source of Loss of Power	Amount of Loss Per Cent.	Efficiency Per Cent.
		100
When driving direct:		
One chain	3.0	....
One and one-half pairs of bearings	7.5	89.5
With epicylic speed gear in operation, add	15.0	74.5
When driving direct:		
One set of gear	5.0	....
Two pairs of bearings	10.0	....
Partially active bearings	3.0	82.0
With change-speed reduction gear in operation, add	12.0	70.0
One set of gear	5.0	....
Three pairs of bearings	15.0	....
Equivalent of two chains	6.0	74.0
Two sets of gear	10.0	....
Four pairs of bearings	20.0	70.0
Two sets of gear	10.0	....
Five pairs of bearings	25.0	....
Equivalent of one chain	3.0	62.0
Equivalent of three sets of gear	15.0	....
Five pairs of bearings	25.0	60.0

TRACTION EFFORT ON VARIOUS SURFACES (NORRIS)

On rails or plates	5.16	pounds per ton
Asphalt or hardwood	12.24	" " "
Macadam	30.60	" " "
Loose gravel	140 to 200	" " "
Sand	400	" " "
With different tires (comparatively):		
Iron	60	" " "
Solid Rubber	60	" " "
Pneumatic	45	" " "

Index to Tables and Data appears on Pages 27 to 30.

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WORK DONE BY CLUTCH AND BRAKES (C. H. TAYLOR)

Energy absorption of the clutch in accelerating a motor vehicle, assuming the ideal condition of uniform acceleration

$$W = \frac{MV\,(2Q - FV)}{2(F - Mg\theta)}$$

and

$$w = Q - \frac{FV}{2}$$

$$f = \frac{MV}{F - Mg\,\theta}$$

where W = total energy absorbed by clutch in accelerating the mass M from zero to V ft. per second when coupled with a motor developing Q foot-pounds per second; w = energy per second absorbed by clutch under the above conditions $= \frac{W}{f}$ where f = time required for acceleration in seconds. θ = tangent of the grade angle, or the per cent. of grade; F = accelerative force applied by the propelling system; g = gravity = 32.2. Also.

$$W = MV\left(\frac{Q}{F} - \frac{V}{2}\right)$$

here $\theta = o$ and

$$f = \frac{MV}{F}.$$

Energy required to be absorbed by the brakes when stopping a motor vehicle, on the level, from full speed is equal to

$$E = \frac{MV^2 + Mg\theta fV}{2}$$

$$f = \frac{MV}{F - Mg\theta}$$

using the same symbols as for the clutch formula, but applied to retardation instead of acceleration

Index to Tables and Data appears on Pages 27 to 30.

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POWER CONSUMED IN MOVING A PLANE SURFACE AT DIFFERENT VELOCITIES IN THE OPEN AIR (KEMPE)

SPEED IN		Horse-power per Square Foot of Effective Surface	SPEED IN		Horse-power per Square Foot of Effective Surface
Miles per Hour	Feet per Minute		Miles per Hour	Feet per Minute	
10	880	0.013	50	4,400	1.64
15	1,320	0.044	75	6,600	5.54
20	1,760	0.105	100	8,800	13.13
25	2,200	0.205	150	13,200	44.29
30	2,640	0.354	200	17,600	105.00

STRIKING ENERGY OF AUTOMOBILES (DURAND)

Let W = weight of automobile, measured in pounds.
F = average force over the distance required to bring automobile to rest, measured in pounds.
L = distance over which force is exerted to bring automobile to rest, measured in feet.
V = velocity in feet per second,

Then Energy $= \dfrac{W V^2}{64.4}$ in foot pounds,

$F L$ = measure of destructive work done in stopping the machine.

Then $$F L = \frac{W V^2}{64.4}$$

$$F = \frac{W V^2}{64.4 L}$$

$$L = \frac{W V^2}{64.4 F}$$

Or, otherwise and more generally, let E be any fraction or amount of energy which is lost in overcoming an average resistance F over a distance L.
Then:

$$E = F L$$
$$F = E \div L$$
$$L = E \div F$$

In the actual case of automobile collision, F, as has been carefully noted, is merely a distance average of the force developed. It means simply that there will be as much destructive work done as would correspond to the exhibition of a force F over a distance L. Actually, the destructive work will be made up of parts, each one of which may consist of a very much larger force, acting through such smaller distance as may be needed for the rupture of the part in question.

Index to Tables and Data appears on Pages 27 to 30.

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ALLOWANCES FOR FITS IN AUTOMOBILE CONSTRUCTION

Fits in automobile construction can be divided into,

Force Fits.

To be used in parts where disassembling will hardly be required, and which are assembled by means of hydraulic or screw presses, or when hot.

Driving Fits.

To be used in parts where close adherence is required, but which must be as embled and disassembled with no other help than an ordinary hammer; such as flywheels, gear wheels, ball-bearing inner races, etc.

Push Fits.

To be used in parts without relative motion in actual work but which must have sufficient freedom to be assembled by hand; such as bolts, slip joints, ball-bearing outer races, etc.

Running Fits.

To be used in parts possessed of relative motion in normal running; these can be subdivided into,

Easy Fits; where great freedom of running is required with possibility of scant lubrication, such as valve guides, control connections, clutch shafts, etc.

Close Fits; to be used in all high-speed work and especially the engine and transmission.

Fine Fits; to be used in parts where great accuracy is required or where, while the motion is slight the stresses are of an alternating or vibratory nature, such as connecting rod small ends, steering connections etc.; efficient lubrication must be provided if the motion is frequently recurring.

FIT ALLOWANCES

In the allowances given in the following the expansion of metals when of different nature or exposed to heat in a different degree, such as is the case in some parts of engine construction, has not been taken into account.

Allowance Over Nominal Diameter for Force Fits

Nominal diameter	½"	1"	2"	3"
Maximum "	0.50100	1.00200	2.00400	3.00600
Minimum "	0.50050	1.00150	2.00300	3.00450

Allowance Over Nominal Diameter for Driving Fits

Nominal diameter	½"	1"	2"	3"
Maximum "	0.50050	1.00100	1.00125	1.00250
Minimum "	0.50025	1.00075	1.00100	1.00150

Allowance Below Nominal Diameter for Push Fits

Nominal diameter	½"	1"	2"	3"
Maximum "	0.49975	0.99950	1.99900	2.99850
Minimum "	0.49925	0.99900	1.99850	2.99800

Allowance Below Nominal Diameter for Running Fits

EASY FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.49900	0.99875	1.99825	2.99800
Minimum "	0.49800	0.99725	1.99650	2.99575

CLOSE FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.59925	0.99900	1.99875	2.99850
Minimum "	0.59875	0.99800	1.99750	2.99700

FINE FITS

Nominal diameter	½"	1"	2"	3"
Maximum "	0.59950	0.99925	1.99925	2.99900
Minimum "	0.59925	0.99875	1.99850	2.99800

For intermediate dimensions comparison between the size immediately below and that mediately above will give the safe allowances in each case.

Index to Tables and Data appears on Pages 27 to 30.

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ENERGY CONSUMPTION OF COMMERCIAL VEHICLES (CHURCH-WARD)

The tractive effort of pneumatic tires on hard level asphalt varies from 15 pounds per ton for special tires designed for electric runabouts up to 35 pounds per ton for the standard type used on gasoline touring cars.

The tractive effort of pneumatic tires is also greatly affected by the air pressure increasing rapidly as the air pressure is reduced.

The tractive effort of solid tires on hard level asphalt varies from 18 pounds to 26 pounds per ton, depending upon:

(1) The diameter of driving wheels.
(2) Revolutions per minute.
(3) Load in pounds, per square inch or pounds per inch width.
(4) Composition of the compound used.
(5) Method of attaching tire to wheel rim.

The tractive effort of a vehicle will vary with the road surface as per table, taking the tractive effort of a vehicle on hard level alphalt as unity.

(1) Level asphalt (hard)	1.00
(2) Wood pavement	1.15
(3) Level macadam	1.15 to 3
(4) Plank road	.9
Cobble stones	1.75
(5) Good dirt road	1.10 to 2
(6) Ordinary country road (dirt)	2.
(7) Sand	20

The tractive effort due to grades must be added to the tractive effort for a given road surface. Example: 5 per cent. grade on hard level asphalt. Hard level asphalt 25 pounds per ton. 5 per cent. grade = 100 pounds per ton, due to grade alone. 100 + 25 = total tractive effort = 125 pounds per ton, total.

Taking everything into consideration, that is to say, life of engine, transmission, tires and maintenance of vehicle as a whole, experience shows that the following table of economic speeds is approximately correct:

Gross Weight	Type of Tires	Speed in M.P.H.
1,500 lbs.	Pneumatic	20
2,000 "	"	20
3,000 "	"	18
4,000 "	"	16
2,000 "	Solid	16
3,000 "	"	15
4,000 "	"	13
5,000 "	"	11
7,000 "	"	9
10,000 "	"	8
15,000 "	"	7
20,000 "	"	6

Index to Tables and Data appears on Pages 27 to 30.

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RESULTS OF 1910 FRENCH MILITARY WAGON TRIALS

Official results of the French regularity and fuel tests of military motor vehicles in 1910 issued by the Automobile Club of France are contained in the accompanying table. The tests covered a total distance of 1570 miles. Gasoline, benzol and alcohol were used as fuels at different stages of the test. The results show an average mileage for the different fuels as follows: Gasoline, 9.7 miles to the gallon; benzol, 10.4 miles to the gallon; alcohol, 8.2 miles to the gallon. Weather and road conditions during the trials were favorable.

FUEL CONSUMPTION OF MOTOR WAGONS IN FRENCH MILITARY TRIALS.

	Total Wgt., Lbs.	Useful Load, Lbs.	Lubricating Oil 1570 Miles		Gasoline 560 Miles			Benzol 560 Miles			Carbureted Alcohol 450 Miles		
			Total in Galls.	Miles per Gall.	Avge. Speed m.p.h.	Total Galls.	Miles per Gall.	Avge. Speed m.p.h.	Total Galls.	Miles per Gall.	Avge. Speed m.p.h.	Total Galls.	Miles per Gall.
*Saurer	12,658	5,796	....	368	14.6	....	9.4	....	....	10.8	....	....	8.1
*Delahaye	14,524	7,896	....	194	11.0	....	11.1	....	....	11.15	....	....	10.5
DeDion Bouton	13,299	8,427	6.2	254	9.5	49.5	11.3	9.8	47.9	11.7	9.6	49.0	9.2
DeDion Bouton	13,161	7,444	4.9	320	9.5	54.5	10.3	9.8	50.0	11.4	9.7	49.0	9.2
Peugeot	13,106	7,903	8.8	178	10.4	54.5	10.3	9.5	53.0	10.6	10.4	54.3	8.3
Peugeot	13,346	8,143	8.8	178	10.4	55.1	10.1	9.5	50.8	11.0	10.5	53.0	8.5
Delahaye	13,855	8,593	7.5	209	8.6	63.0	8.9	8.2	65.0	8.6	7.7	62.4	7.2
Delahaye	13,822	8,553	8.8	178	8.6	68.8	8.2	8.2	67.0	8.4	7.8	69.2	6.5
Panhard-Levassor	12,323	7,609	15.0	145	9.6	49.8	11.2	9.5	51.0	10.9	9.8	49.4	9.1
Panhard-Levassor	12,336	7,640	18.5	85	9.7	50.4	11.1	9.5	49.6	11.3	9.8	50.5	8.9
Panhard-Levassor	13,653	8,703	19.8	79	9.8	56.1	10.0	9.8	58.3	9.6	10.2	51.2	8.8
Panhard-Levassor	13,564	8,670	16.3	96	9.7	54.5	10.3	9.9	55.5	10.1	10.2	56.2	8.1
Berliet	11,827	7,465	7.5	209	8.5	62.6	9.0	8.8	59.4	9.5	8.5	63.8	7.1
Berliet	11,838	7,473	7.5	209	8.5	63.5	8.8	8.8	53.6	10.4	8.5	58.2	7.6
Berliet	14,651	9,801	14.3	110	8.3	75.2	7.5	8.5	54.0	10.4	8.3	55.8	8.0
Berliet	14,631	9,781	15.6	100	8.2	76.5	7.3	8.5	56.3	10.0	8.3	70.6	6.4
Vinot-Deguingand	10,987	6,864	5.9	266	9.8	45.5	12.3	9.5	44.4	12.6	9.8	41.8	10.7
Vinot-Deguingand	10,832	6,710	9.7	162	9.8	46.4	12.1	9.7	46.0	12.2	10.3	45.4	9.

*1909 Winner.
Useful load includes weight of body.

CO-EFFICIENTS OF FRICTION

The relative value of different materials of construction ascertained as the result of tests made by the National Brake & Clutch Company is tabulated as follows:

Materials	Co-efficient
Metal and cork, Leather and cork, Fibre and cork, on dry metal	0.35
Metal and cork, Leather and cork, Fibre and cork, on oily metal	0.32
Fibre on dry metal	0.27
Fibre on oily metal	0.10
Leather on dry metal	0.23
Leather on oily metal	0.15
Charred leather on oily metal	0.08
Metal on dry metal	0.15
Metal on oily metal	0.07

The co-efficient will vary with the condition of the contacting surfaces. Smooth and unyielding surfaces offer less resistance than rough and yielding ones. In metal to metal contacts different metals are usually employed for the opposing surfaces, as bronze and steel in plate clutches and cast iron and steel in brakes of the shoe type.

Index to Tables and Data appears on Pages 27 to 30.

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PRINCIPAL OVERALL DIMENSIONS OF TYPICAL MODERN CARS

H.P.	Type—Remarks	Wheelbase		Length		Width		Height	
		Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
14–16	Side entrance	8	4	12	6	5	2	5	3
14–16	Side entrance (hood up)	8	4	12	6	5	2	7	5
14–16	Side entrance (hood folded)	8	4	13	6	5	2	5	6
14–16	Single landaulette	9	0	13	0	5	2	7	0
14–16	Limousine	9	0	13	0	5	2	7	0
14–16	City carriage	6	10	10	8	5	5	7	4
16–20	Side entrance	9	0	13	0	5	3	5	5
16–20	Side entrance (hood up)	9	0	13	0	5	3	7	7
16–20	Side entrance (hood folded)	9	0	14	0	5	3	5	8
16–20	Seven-seater side entrance	9	9	13	10	5	3	5	5
16–20	Three-quarter landaulette	9	9	13	10	5	3	7	7
16–20	Limousine	9	9	13	10	5	3	7	7
26–30	Side entrance	9	3	13	4	5	7	5	5
26–30	Side entrance (hood up)	9	3	13	4	5	7	7	7
26–30	Side entrance (hood folded)	9	3	14	4	5	7	5	8
26–30	Three-quarter landaulette	10	0	14	1	5	5	7	8
26–30	Limousine	10	0	14	1	5	7	7	8
40	Side entrance	9	8	13	8	6	0	5	6
40	Side entrance (hood up)	9	8	13	8	6	0	7	8
40	Side entrance (hood folded)	9	8	14	8	6	0	5	9
40	Seven-seater side entrance	10	4	14	4	6	0	5	6
40	Three-quarter landaulette	10	4	14	4	6	0	7	8
40	Limousine	10	4	14	4	6	0	7	8

N.B.—In some cases the lamps mean a further increase in length.

From these figures it is possible to deduce the fact that the average additive quantity which the car projects beyond the centers of the wheels is 4 feet 4½ inches. Taking this at 4 feet 6 inches, it is possible to compute the overall length of any car.

FORMULA FOR RATE OF SPEED (TREGO)

To find the rate of speed of an automobile in miles per hour when the total distance covered and the total running time are known:

Given: Time in minutes and seconds and distance.

Using minutes.

Formula is:

$$\frac{D}{\frac{T}{60}} = MPH$$

Divide the time in minutes and fractions thereof by 60. Then divide the distance by this quotient, disregarding decimal points, and the result will be the average speed in miles per hour for the distance.

Example: 105.5 miles in 113 minutes 30 seconds.

```
60)113.5
   ------
 1.89)105.5(55.8 miles per hour.
      945
      ----
      1100
       945
      ----
      1550
      1512
      ----
```

Using seconds,

Formula is:

$$\frac{36}{T \text{ (Time in seconds)}} = MPH.$$

Divide 36 by the time in seconds, the distance being 1 mile.

Example: 1 mile in 45 seconds—

```
45)36 (80 miles per hour.
   360
```

Index to Tables and Data appears on Pages 27 to 30.

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REVOLUTIONS PER MINUTE OF AUTO ROAD WHEELS AT DIFFERENT RATES OF SPEED

Miles per Hour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30	35	40
Feet per Minute	88	176	264	352	440	528	616	704	792	880	968	1,056	1,144	1,232	1,320	1,418	1,496	1,584	1,672	1,760	1,936	2,112	2,288	2,464	2,640	3,080	3,520
WHEEL DIAMETERS 12	28	56	84	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504	532	560	616	672	728	784	840	980	1,120
14	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	528	576	624	672	720	840	960
16	21	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	462	504	546	588	630	735	840
18	18.6	37.33	56	72.66	93.33	112	130.66	145.33	168	186.66	203.33	224	242.66	161.33	280	298.66	317.33	336	354.66	373.33	410.66	448	485.33	522.66	560	653.33	746.66
20	16.8	32.6	50.4	67.2	84	100.8	117.6	134.4	151.2	168	184.8	201.6	218.4	235.2	252	268.8	285.6	302.4	319.2	336	369.6	403.2	436.8	470.4	504	588	672
22	15.27	30.54	45.81	61.09	76.36	91.63	106.90	122.18	137.45	152.72	168	183.27	198.54	213.81	229.09	244.36	259.63	274.90	290.18	305.45	336	366.54	397.09	427.63	458.18	534.54	611.09
24	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	308	336	364	392	420	490	560
26	12.92	21.84	38.76	51.69	63.61	77.53	90.46	103.38	116.30	129.23	142.15	155.07	168	180.92	193.84	206.76	219.69	232.61	245.53	258.46	284.30	310.15	336	361.84	397.69	452.30	516.92
28	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	264	288	312	336	360	420	480
30	11.2	22.4	33.6	44.8	56	67.2	78.4	89.6	100.8	112	123.2	134.4	145.6	156.8	168	179.2	190.4	201.6	212.8	224	246.4	268.8	291.2	313.6	336	392	448
32	10.5	21	31.5	42	52.5	63	73.5	84	94.5	105	115.5	126	136.5	147	157.5	168	178.5	189	199.5	210	231	252	273	294	315	367.5	420
34	9.88	19.70	29.64	39.52	49.41	59.29	69.17	79.05	88.94	98.82	108.70	118.58	128.47	138.35	148.23	158.11	168	177.88	187.76	197.64	217.41	237	256.94	276.70	296.47	345.88	395.29
36	9.33	18.66	28	37.33	46.66	56	65.33	74.66	84	93.33	102.66	112	121.33	130.66	140	149.33	158.66	168	177.33	186.66	205.33	224	242.66	261.33	280	326.66	373.33
38	8.8	17.68	26.52	35.36	44.21	53.05	61.89	70.73	79.57	88.42	97.27	106.10	114.94	123.78	132.63	141.47	150.31	159.15	168	176.84	194.52	212.21	238.89	247.57	265.26	309.21	353.42
40	8.4	16.8	25.2	33.6	42	50.4	58.8	67.2	75.6	84	92.4	100.8	109.2	117.6	126	134.4	142.8	151.2	159.6	168	184.8	201.6	218.4	235.2	252	294	336
42	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	176	192	208	224	240	280	320
44	7.63	15.27	22.10	30.54	38.18	45.81	53.45	61.09	68.72	76.36	84	91.63	99.24	106.10	114.54	122.18	129.81	137.45	145.09	156.72	168	183.27	198.54	213.81	229.09	267.27	305.45

Index to Tables and Data appears on Pages 27 to 30.

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RATE OF SPEED IN MILES PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE FROM ONE TO THREE MINUTES

Time Over Measured Mile		Rate of Speed in Miles per Hour	Time Over Measured Mile		Rate of Speed in Miles per Hour	Time Over Measured Mile		Rate of Speed in Miles per Hour
Min.	*Sec.*		*Min.*	*Sec.*		*Min.*	*Sec.*	
1	0	60.00	1	27	41.38	1	54	31.58
1	1	59.00	1	28	40.91	1	55	31.30
1	2	58.06	1	29	40.45	1	56	31.03
1	3	57.14	1	30	40.00	1	57	30.77
1	4	56.25	1	31	39.56	1	58	30.50
1	5	55.38	1	32	39.13	1	59	30.25
1	6	54.54	1	33	38.71	2	0	30.00
1	7	53.73	1	34	38.29	2	3	29.26
1	8	52.94	1	35	37.89	2	6	28.57
1	9	52.17	1	36	37.50	2	9	27.90
1	10	51.42	1	37	37.11	2	12	27.27
1	11	50.70	1	38	36.73	2	15	26.66
1	12	50.00	1	39	36.36	2	18	26.08
1	13	49.31	1	40	36.00	2	21	25.53
1	14	48.65	1	41	35.64	2	24	25.00
1	15	48.00	1	42	35.29	2	27	24.49
1	16	47.37	1	43	34.95	2	30	24.00
1	17	46.75	1	44	34.61	2	33	23.53
1	18	46.15	1	45	34.28	2	36	23.07
1	19	45.57	1	46	33.96	2	39	22.64
1	20	45.00	1	47	33.64	2	42	22.22
1	21	44.44	1	48	33.33	2	45	21.81
1	22	43.90	1	49	33.03	2	48	21.42
1	23	43.37	1	50	32.72	2	51	21.05
1	24	42.85	1	51	32.43	2	54	20.69
1	25	42.35	1	52	32.14	3	0	20.00
1	26	41.86	1	53	31.86	..	..	.....

SPEED FORMULA

To reduce *A* miles in *B* seconds to miles per hour,

$$A \times \frac{3600}{B} = \text{miles per hour.}$$

SPEED EQUIVALENTS IN AMERICAN AND FRENCH MEASUREMENTS

1 mile per hour	= 88	ft. per minute.
	= 1.46	ft. per second.
	= 27.8	metres per minute.
	= 0.463	metre per second.
1 km. per hour	= 0.624	miles per hour.
	= 54.9	ft. per minute.
	= 0.914	metre per second.

Index to Tables and Data appears on Pages 27 to 30.

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REFERENCE TABLE SHOWING EQUIVALENT SPEED IN MILES AND KILOMETERS PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE OR MEASURED KILOMETER FROM 24 SECONDS PROGRESSIVELY BY 1-5 SECOND TO 59 4-5 SECONDS

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres. per hour.	Time of one Kilometre m. s.	Equal to Kilometres. per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilo metres per hour.	Time of one Kilometre m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
24	150.00	241.54	24	150.00	93.15	35	102.85	165.62	35	102.85	63.87
1/5	148.76	239.55	1/5	148.76	92.38	1/5	102.27	164.68	1/5	102.27	63.51
2/5	147.54	237.58	2/5	147.54	91.62	2/5	101.69	163.75	2/5	101.69	63.15
3/5	146.34	235.65	3/5	146.34	90.87	3/5	101.12	162.83	3/5	101.12	62.79
4/5	145.16	233.75	4/5	145.16	90.14	4/5	100.56	161.93	4/5	100.56	62.44
25	144.00	231.88	25	144.00	89.42	36	100.00	161.03	36	100.00	62.10
1/5	142.86	230.05	1/5	142.86	88.71	1/5	99.44	160.13	1/5	99.44	61.75
2/5	141.73	228.23	2/5	141.73	88.01	2/5	98.90	159.26	2/5	98.90	61.41
3/5	140.62	226.44	3/5	140.62	87.32	3/5	98.36	158.39	3/5	98.36	61.08
4/5	139.53	224.67	4/5	139.53	86.64	4/5	97.82	157.52	4/5	97.82	60.74
26	138.46	222.96	26	138.46	85.98	37	97.29	156.67	37	97.29	60.41
1/5	137.40	221.25	1/5	137.40	85.32	1/5	96.77	155.83	1/5	96.77	60.09
2/5	136.36	219.58	2/5	136.36	84.68	2/5	96.25	155.00	2/5	96.25	59.77
3/5	135.34	217.94	3/5	135.34	84.04	3/5	95.74	154.17	3/5	95.74	59.45
4/5	134.33	216.31	4/5	134.33	83.42	4/5	95.23	153.34	4/5	95.23	59.13
27	133.33	214.70	27	133.33	82.80	38	94.73	152.55	38	94.73	58.82
1/5	132.25	213.12	1/5	132.35	82.19	1/5	94.24	151.75	1/5	94.24	58.52
2/5	131.38	211.56	2/5	131.38	81.58	2/5	93.75	150.96	2/5	93.75	58.22
3/5	130.43	210.03	3/5	130.43	80.10	3/5	93.26	150.17	3/5	93.26	57.91
4/5	129.50	208.53	4/5	129.50	80.42	4/5	92.78	149.40	4/5	92.78	57.61
28	128.57	207.03	28	128.57	79.84	39	92.30	148.64	39	92.30	57.32
1/5	127.66	205.57	1/5	127.66	79.27	1/5	91.83	147.87	1/5	91.83	57.02
2/5	126.76	204.12	2/5	126.76	78.71	2/5	91.37	147.13	2/5	91.37	56.74
3/5	125.87	202.69	3/5	125.87	78.16	3/5	90.91	146.39	3/5	90.91	56.45
4/5	125.00	201.29	4/5	125.00	77.62	4/5	90.45	145.65	4/5	90.45	56.17
29	124.13	199.88	29	124.13	77.08	40	90.00	144.92	40	90.00	55.89
1/5	123.28	198.52	1/5	123.28	76.55	1/5	89.55	144.20	1/5	89.55	55.61
2/5	122.45	197.18	2/5	122.45	76.04	2/5	89.11	143.49	2/5	89.11	55.33
3/5	121.62	195.84	3/5	121.62	75.52	3/5	88.67	142.78	3/5	88.67	55.06
4/5	120.80	194.52	4/5	120.80	75.01	4/5	88.23	142.07	4/5	88.23	54.79
30	120.00	193.23	30	120.00	74.52	41	87.80	141.39	41	87.80	54.52
1/5	119.20	191.95	1/5	119.20	74.02	1/5	87.38	140.70	1/5	87.38	54.26
2/5	118.42	190.69	2/5	118.42	73.54	2/5	86.95	140.01	2/5	86.95	53.99
3/5	117.64	189.43	3/5	117.64	73.05	3/5	86.53	139.34	3/5	86.53	53.73
4/5	116.88	188.21	4/5	116.88	72.58	4/5	86.12	138.68	4/5	86.12	53.48
31	116.13	187.00	31	116.13	72.11	42	85.71	138.02	42	85.71	53.22
1/5	115.38	185.79	1/5	115.38	71.65	1/5	85.30	137.35	1/5	85.30	52.97
2/5	114.65	184.62	2/5	114.65	71.20	2/5	84.90	136.71	2/5	84.90	52.72
3/5	113.90	183.41	3/5	113.90	70.73	3/5	84.50	136.07	3/5	84.50	52.47
4/5	113.21	182.28	4/5	113.21	70.30	4/5	84.11	135.44	4/5	84.11	52.23
32	112.50	181.16	32	112.50	69.86	43	83.72	134.81	43	83.72	51.99
1/5	111.80	180.03	1/5	111.80	69.43	1/5	83.33	134.18	1/5	83.33	51.75
2/5	111.11	178.92	2/5	111.11	69.00	2/5	82.95	133.57	2/5	82.95	51.51
3/5	110.43	177.82	3/5	110.43	68.57	3/5	82.57	132.96	3/5	82.57	51.27
4/5	109.75	176.73	4/5	109.75	68.15	4/5	82.19	132.35	4/5	82.19	51.04
33	109.09	175.67	33	109.09	67.74	44	81.81	131.75	44	81.81	50.80
1/5	108.43	174.60	1/5	108.43	67.33	1/5	81.44	131.14	1/5	81.44	50.57
2/5	107.78	173.56	2/5	107.78	66.93	2/5	81.08	130.56	2/5	81.08	50.35
3/5	107.14	172.53	3/5	107.14	66.53	3/5	80.71	129.96	3/5	80.71	50.12
4/5	106.51	171.51	4/5	106.51	66.14	4/5	80.35	129.38	4/5	80.35	49.89
34	105.88	170.50	34	105.88	65.75	45	80.00	128.82	45	80.00	49.68
1/5	105.26	169.50	1/5	105.26	65.36	1/5	79.64	128.24	1/5	79.64	49.45
2/5	104.65	168.52	2/5	104.65	64.98	2/5	79.29	127.68	2/5	79.29	49.24
3/5	104.04	167.53	3/5	104.04	64.61	3/5	78.94	127.11	3/5	78.94	49.02
4/5	103.45	166.58	4/5	103.45	64.24	4/5	78.60	126.57	4/5	78.60	48.81

(*Continued on page* 587)

Index to Tables and Data appears on Pages 27 to 30.

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Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres. per hour.	Time of one Kilometre m. s.	Equal to Kilometres. per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilo metres per hour.	Time of one Kilometre m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
46	78.26	126.02	46	78.26	48.60	53	67.92	109.38	53	67.92	42.18
1/5	77.92	125.47	1/5	77.92	48.39	1/5	67.66	108.95	1/5	67.66	42.01
2/5	77.58	124.92	2/5	77.58	48.17	2/5	67.41	108.55	2/5	67.41	41.86
3/5	77.25	124.39	3/5	77.25	47.97	3/5	67.16	108.14	3/5	67.16	41.70
4/5	76.92	123.86	4/5	76.92	47.76	4/5	66.91	107.74	4/5	66.91	41.55
47	76.59	123.34	47	76.59	47.56	54	66.66	107.34	54	66.66	41.39
1/5	76.27	122.81	1/5	76.27	47.36	1/5	66.42	106.95	1/5	66.42	41.24
2/5	75.95	122.30	2/5	75.95	47.16	2/5	66.17	106.55	2/5	66.17	41.09
3/5	75.63	121.78	3/5	75.63	46.96	3/5	65.93	106.16	3/5	65.93	40.94
4/5	75.31	121.27	4/5	75.31	46.76	4/5	65.69	105.78	4/5	65.69	40.79
48	75.00	120.77	48	75.00	46.57	55	65.45	105.40	55	65.45	40.64
1/5	74.68	120.25	1/5	74.68	46.37	1/5	65.21	105.00	1/5	65.21	40.49
2/5	74.38	119.77	2/5	74.38	46.19	2/5	64.98	104.63	2/5	64.98	40.35
3/5	74.07	119.27	3/5	74.07	46.00	3/5	64.74	104.25	3/5	64.74	40.20
4/5	73.77	118.79	4/5	73.77	45.81	4/5	64.51	103.88	4/5	64.51	40.06
49	73.47	118.30	49	73.47	45.62	56	64.28	103.52	56	64.28	39.92
1/5	73.17	117.82	1/5	73.17	45.44	1/5	64.05	103.14	1/5	64.05	39.77
2/5	72.87	117.34	2/5	72.87	45.25	2/5	63.83	102.78	2/5	63.83	39.64
3/5	72.58	116.87	3/5	72.58	45.07	3/5	63.60	102.41	3/5	63.60	39.49
4/5	72.29	116.40	4/5	72.29	44.89	4/5	63.38	102.06	4/5	63.38	39.36
50	72.00	115.94	50	72.00	44.71	57	63.16	101.70	57	63.16	39.22
1/5	71.71	115.47	1/5	71.71	44.53	1/5	62.93	101.33	1/5	62.93	39.08
2/5	71.42	115.00	2/5	71.42	44.35	2/5	62.71	100.98	2/5	62.71	38.94
3/5	71.14	114.55	3/5	71.14	44.18	3/5	62.50	100.64	3/5	62.50	38.81
4/5	70.86	114.10	4/5	70.86	44.00	4/5	62.28	100.29	4/5	62.28	38.67
51	70.58	113.67	51	70.58	43.83	58	62.07	99.95	58	62.07	38.54
1/5	70.31	113.22	1/5	70.31	43.66	1/5	61.85	99.59	1/5	61.85	38.41
2/5	70.04	112.78	2/5	70.04	43.49	2/5	61.64	99.25	2/5	61.64	38.28
3/5	69.76	112.33	3/5	69.76	43.32	3/5	61.43	98.92	3/5	61.43	38.15
4/5	69.49	111.90	4/5	69.49	43.15	4/5	61.22	98.58	4/5	61.22	38.01
52	69.23	111.48	52	69.23	42.99	59	61.01	98.24	59	61.01	37.88
1/5	68.96	111.04	1/5	68.96	42.82	1/5	60.81	97.92	1/5	60.81	37.76
2/5	68.70	110.62	2/5	68.70	42.66	2/5	60.60	97.58	2/5	60.60	37.63
3/5	68.44	110.21	3/5	68.44	42.50	3/5	60.40	97.26	3/5	60.40	37.51
4/5	68.18	109.79	4/5	68.18	42.34	4/5	60.20	96.94	4/5	60.20	37.38

REFERENCE TABLE SHOWING EQUIVALENT SPEED IN MILES AND KILOMETERS PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE OR MEASURED KILOMETER FROM 1 MINUTE TO 30 MINUTES

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres. per hour.	Time of one Kilometre m. s.	Equal to Kilometres. per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour.	Time of one Kilometre m. s.	Equal to Kilometres per hour.	Equal to mile per hour.
1 0	60.00	96.61	1 0	60.00	37.26	1 17	46.75	75.28	1 17	46.75	29.03
1 1	59.00	95.00	1 1	59.00	36.64	1 18	46.15	74.31	1 18	46.15	28.66
1 2	58.06	93.49	1 2	58.06	36.05	1 19	45.57	73.38	1 19	45.57	28.30
1 3	57.14	92.01	1 3	57.14	35.48	1 20	45.00	72.46	1 20	45.00	27.94
1 4	56.25	90.58	1 4	56.25	34.93	1 21	44.44	71.56	1 21	44.44	27.60
1 5	55.38	89.17	1 5	55.38	34.39	1 22	43.90	70.69	1 22	43.90	27.26
1 6	54.54	87.82	1 6	54.54	33.87	1 23	43.37	69.84	1 23	43.37	26.93
1 7	53.73	86.52	1 7	53.73	33.36	1 24	42.85	69.00	1 24	42.85	26.61
1 8	52.94	85.25	1 8	52.94	32.87	1 25	42.35	68.19	1 25	42.35	26.30
1 9	52.17	84.01	1 9	52.17	32.40	1 26	41.86	67.40	1 26	41.86	26.00
1 10	51.42	82.80	1 10	51.42	31.93	1 27	41.38	66.63	1 27	41.38	25.7
1 11	50.70	81.64	1 11	50.70	31.48	1 28	40.91	65.87	1 28	40.91	25.40
1 12	50.00	80.51	1 12	50.00	31.05	1 29	40.45	65.13	1 29	40.45	25.10
1 13	49.31	79.40	1 13	49.31	30.62	1 30	40.00	64.41	1 30	40.00	24.84
1 14	48.65	78.34	1 14	48.65	30.21	1 31	39.56	63.70	1 31	39.56	24.56
1 15	48.00	77.29	1 15	48.00	29.81	1 32	39.13	63.01	1 32	39.13	24.30
1 16	47.37	76.28	1 16	47.37	29.41	1 33	38.71	62.33	1 33	38.71	24.04

(*Continued on page* 588)

Index to Tables and Data appears on Pages 27 to 30.

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Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres. per hour.	Time of 1 Kilometre m. s.	Equal to Kilometres. per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour	Time of 1 Kilometre m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
1 34	38.29	61.66	1 34	38.29	23.77	3 6	19.35	31.16	3 6	19.35	12.01
1 35	37.89	61.01	1 35	37.89	23.53	3 12	18.75	30.19	3 12	18.75	11.64
1 36	37.50	60.38	1 36	37.50	23.28	3 18	18.18	29.27	3 18	18.18	11.29
1 37	37.11	59.76	1 37	37.11	23.04	3 24	17.64	28.40	3 24	17.64	10.95
1 38	36.73	59.14	1 38	36.73	22.81	3 30	17.14	27.60	3 30	17.14	10.64
1 39	36.36	58.55	1 39	36.36	22.58	3 36	16.66	26.82	3 36	16.66	10.34
1 40	36.00	57.97	1 40	36.00	22.35	3 42	16.21	26.10	3 42	16.21	10.06
1 41	35.64	57.39	1 41	35.64	22.13	3 48	15.79	25.42	3 48	15.79	9.80
1 42	35.29	56.82	1 42	35.29	21.91	3 54	15.38	24.76	3 54	15.38	9.55
1 43	34.95	56.28	1 43	34.95	21.70	4 0	15.00	24.15	4 0	15.00	9.31
1 44	34.61	55.73	1 44	34.61	21.50	4 6	14.63	23.56	4 6	14.63	9.08
1 45	34.28	55.20	1 45	34.28	21.28	4 12	14.28	22.99	4 12	14.28	8.86
1 46	33.96	54.68	1 46	33.96	21.09	4 18	13.95	22.46	4 18	13.95	8.66
1 47	33.64	54.17	1 47	33.64	20.89	4 24	13.63	21.95	4 24	13.63	8.46
1 48	33.33	53.67	1 48	33.33	20.70	4 30	13.33	21.46	4 30	13.33	8.28
1 49	33.03	53.19	1 49	33.03	20.51	4 36	13.04	21.00	4 36	13.04	8.10
1 50	32.72	52.69	1 50	32.72	20.32	4 42	12.76	20.54	4 42	12.76	7.92
1 51	32.43	52.22	1 51	32.43	20.14	4 48	12.50	20.13	4 48	12.50	7.76
1 52	32.14	51.75	1 52	32.14	19.96	4 54	12.24	19.71	4 54	12.24	7.60
1 53	31.86	51.30	1 53	31.86	19.78	5 0	12.00	19.32	5 0	12.00	7.45
1 54	31.58	50.85	1 54	31.58	19.61	5.12	11.54	18.58	5 12	11.54	7.16
1 55	31.30	50.40	1 55	31.30	19.43	5 24	11.11	17.89	5 24	11.11	6.90
1 56	31.03	49.96	1 56	31.03	19.27	5 36	10.71	17.24	5 36	10.71	6.65
1 57	30.77	49.55	1 57	30.77	19.11	5 48	10.34	16.65	5 48	10.34	6.42
1 58	30.50	49.11	1 58	30.50	18.94	6 0	10.00	16.10	6 0	10.00	6.21
1 59	30.25	48.71	1 59	30.25	18.78	6 15	9.60	15.46	6 15	9.60	5.96
2 0	30.00	48.30	2 0	30.00	18.63	6 30	9.23	14.86	6 30	9.23	5.73
2 3	29.26	47.11	2 3	29.26	18.17	6 45	8.88	14.30	6 45	8.88	5.51
2 6	28.57	46.00	2 6	28.57	17.74	7 0	8.57	13.80	7 0	8.57	5.32
2 9	27.90	44.92	2 9	27.90	17.32	7 15	8.27	13.31	7 15	8.27	5.13
2 12	27.27	43.91	2 12	27.27	16.93	7 30	8.00	12.88	7 30	8.00	4.97
2 15	26.66	42.93	2 15	26.66	16.55	7 45	7.74	12.46	7 45	7.74	4.80
2 18	26.08	42.00	2 18	26.08	16.20	8 0	7.50	12.08	8 0	7.50	4.66
2 21	25.53	41.11	2 21	25.53	15.85	8 30	7.06	11.37	8 30	7.06	4.38
2 24	25.00	40.25	2 24	25.00	15.52	9 0	6.66	10.72	9 0	6.66	4.13
2 27	24.49	39.43	2 27	24.49	15.21	9 30	6.31	10.16	9 30	6.31	3.92
2 30	24.00	38.64	2 30	24.00	14.90	10 0	6.00	9.66	10 0	6.00	3.72
2 33	23.53	37.89	2 33	23.53	14.61	10 30	5.71	9.19	10 30	5.71	3.54
2 36	23.07	37.15	2 36	23.07	14.32	11 0	5.45	8.77	11 0	5.45	3.38
2 39	22.64	36.45	2 39	22.64	14.06	11 30	5.21	8.39	11 30	5.21	3.23
2 42	22.22	35.78	2 42	22.22	13.80	12 0	5.00	8.05	12 0	5.00	3.10
2 45	21.81	35.12	2 45	21.81	13.54	13 0	4.61	7.42	13 0	4.61	2.86
2 48	21.42	34.49	2 48	21.42	13.31	14 0	4.28	6.89	14 0	4.28	2.66
2 51	21.05	33.89	2 51	21.05	13.07	15 0	4.00	6.44	15 0	4.00	2.48
2 54	20.69	33.31	2 54	20.69	12.85	20 0	3.00	4.83	20 0	3.00	1.86
2 57	20.34	32.75	2 57	20.34	12.63	30 0	2.00	3.22	30 0	2.00	1.24
3 0	20.00	32.20	3 0	20.00	12.42						

SPEED IN MILES PER HOUR WITH DIFFERENT GEAR RATIOS AND ROAD WHEEL SIZES AT 1000 R. P. M. OF ENGINE (WITH 3 PER CENT. LOSS ALLOWANCE)

GEARS	4:1	3½:1	3:1	2½:1	2:1	1:1
30-in. Wheel....	21.64	24.73	28.86	34.63	43.29	86.57
32 " "	23.09	26.38	30.78	36.94	46.17	92.34
33 " "	23.81	27.21	31.74	38.09	47.62	95.23
34 " "	24.53	28.03	32.70	39.25	49.06	98.12
36 " "	25.98	29.68	34.63	41.55	51.94	103.89
38 " "	27.41	31.33	36.55	43.86	54.83	109.66
40 " "	28.85	32.97	38.37	46.16	57.71	115.41

Index to Tables and Data appears on Pages 27 to 30.

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HILL-CLIMBING FORMULAS (WORBY BEAUMONT)

W = Weight of car and load in pounds.
w = Weight of car and load in tons.
H = Total ascent in feet.
L = Length of hill in feet.
R = Road resistance in pounds per ton weight of car and load.
r = Air resistance in pounds = $V^2 A\ 0.0017$.
V = Velocity of car in feet per second.
A = Area of car in square feet presented to air resistance.
T = Time occupied in ascent in seconds.
E = Efficiency of transmission of power from engine to road wheels.
$H\,P.$ = Effective horse power of engine.
p = Power given off at road wheels or work done in ascending hill.
S = Speed of ascent in miles per hour.
Then if P = Mean effective cylinder pressure.
L = Length of stroke in feet.
A = Area of piston in square inches.
N = Number of useful or firing strokes per minute,

the brake horse-power of petrol or steam engines, having a mechanical efficiency of E, is

$$\frac{EPLAN}{33000}$$

For compound steam engines the number of useful working strokes are those occurring in the low-pressure cylinder, and the mean effective pressure in the high-pressure cylinder or cylinders is referred to the area of the low-pressure cylinder.

The power given off at the road wheels during the ascent of the hill is

$$p = \frac{HW + (Rw + r)L}{T\ 550}$$

and the brake horsepower required at the engine with a selected value or E is

$$HP = \frac{HW + (Rw + r)L}{TE\ 550}$$

With the other conditions known, the efficiency may be found from

$$E = \frac{HW + (Rw + r)L}{HP.\ T\ 550}$$

the speed of the ascent in miles per hour from

$$S = \frac{\dfrac{L}{HWL + (Rw + r)}}{HP.\ E\ 550} L \times 1.466$$

and the time occupied in the ascent from

$$T = \frac{HW + (Rw + r)L}{HP.\ E\ 550}$$

Unless the probable speed of the car is high, or the wind velocity such that the pressure upon the surface of the car presented to air resistance opposing motion approaches that due to the speed of the car through still air, then the quantity r may be omitted from the foregoing expressions without introducing more than slight error.

Index to Tables and Data appears on Pages 27 to 30.

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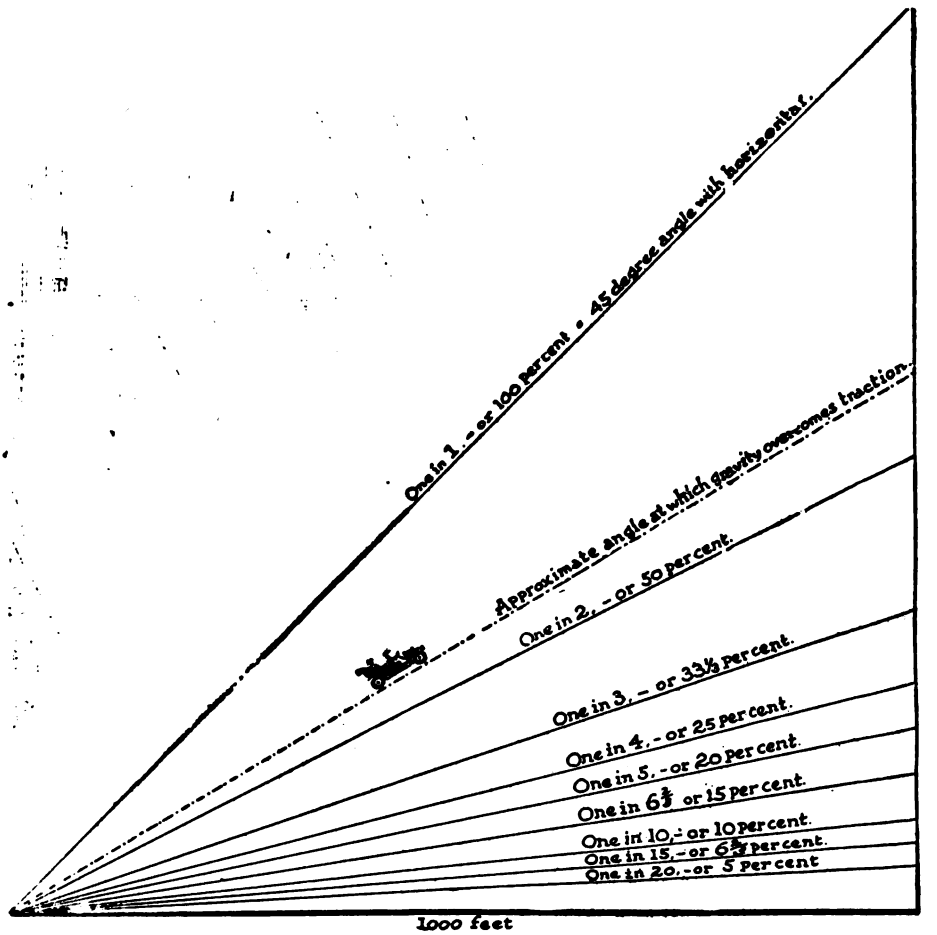
MEASUREMENT OF GRADES



ILLUSTRATING METHOD OF CALCULATING GRADE PERCENTAGES

If it be assumed that the base of the triangle represents a line 1,000 feet long and that the first sloping line represents a road having a rise that brings it 50 feet above the starting point, this is figured as 50 feet in a thousand, or 5 per cent. In other words, one foot of rise for every 20 feet, but the latter distance does not mean distance actually traveled by a car in ascending such a slope, but distance measured horizontally with reference to that slope. The grade is measured by the tangent of the angle of inclination and not by its sine, so that a grade which represents 100 per cent. corresponds to an angle of inclination of but 45 degrees, and not 90 degrees, or perpendicular, as is commonly supposed. At the upper end of the next sloping line the elevation would amount to 66 2/3 feet, which is equivalent to a rise of 6 2/3 feet for each 100 feet traveled horizontally. So one in three corresponds to a 33 1/3 per cent. grade, one in two to a 50 per cent. grade, and so on until a 100 per cent. grade is reached, which, as noted, is the equivalent of a 45 degree angle.

Index to Tables and Data appears on Pages 27 to 30.

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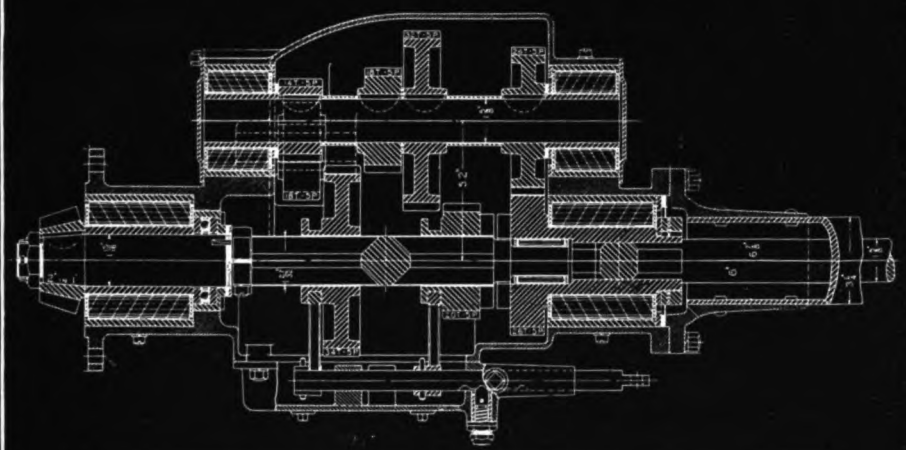
COVERT



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DETROIT, MICH.

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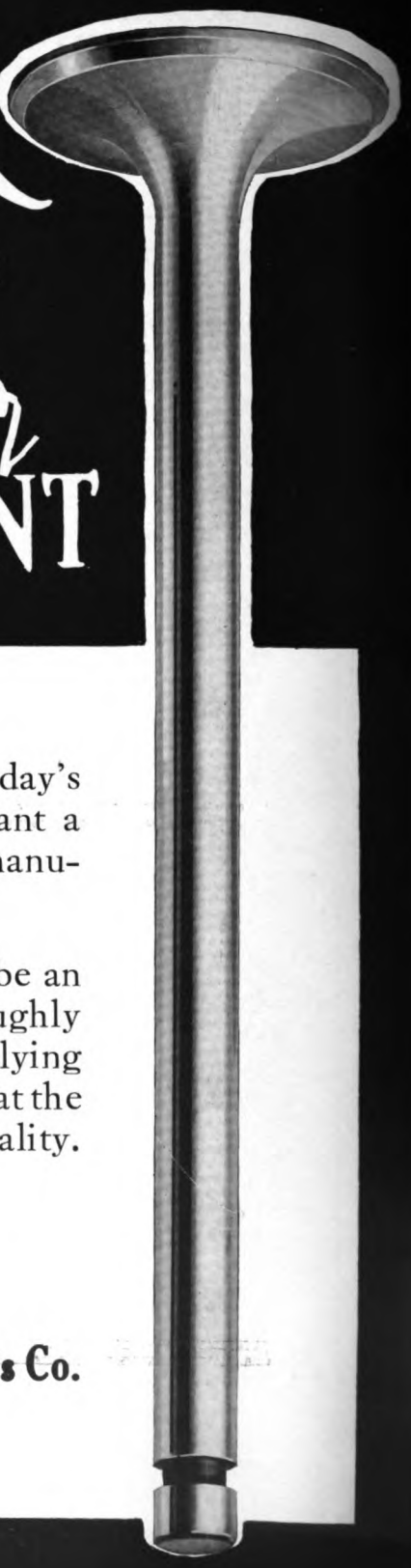

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The Electric Welding Products Co.
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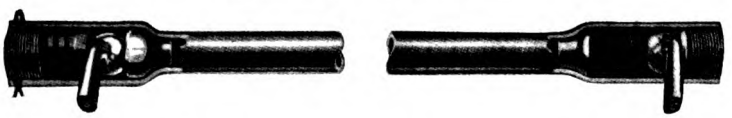

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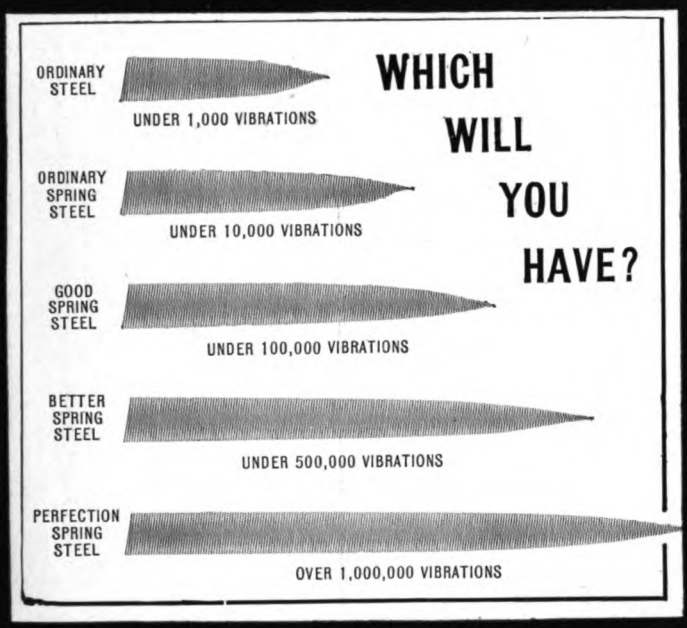

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TABLE OF GRADIENTS

GRADE		Equal to Angle of	Rise or Fall in One Mile, Feet
Per Cent	Units		
20	1 in 5	11° 19′	1056
17	1 " 6	9° 26′	880
14	1 " 7	8° 09′	754
12.5	1 " 8	7° 08′	635
11	1 " 9	6° 17′	586
10	1 " 10	5° 43′	528
9	1 " 11	5° 11′	480
8	1 " 12	4° 46′	440
7.75	1 " 13	4° 24′	406
7	1 " 14	4° 05′	337
6.5	1 " 15	3° 49′	352
6.25	1 " 16	3° 35′	330
6	1 " 17	3° 22′	310
5.5	1 " 18	3° 11′	293
5	1 " 19	3° 00′	277
5	1 " 20	2° 52′	204
4	1 " 25	2° 18′	218
3.3	1 " 30	1° 55′	155
2.8	1 " 35	1° 38′	151
2.5	1 " 40	1° 26′	132

COMPOUND EQUIVALENTS

Atmosphere (14.7 lbs. per square inch) = 1.0335 kilogrammes per square centimetre.
1 Foot-pound = 0.1382 kilogrammetre.
1 lb. per square inch = 0.0703077 kilogramme per square centimetre = 0.7031 gramme per square millimetre = 5.170 centimetres of mercury at 0 degrees Centigrade.
1 Kilogramme per square millimetre = 1422.32 lbs. per square inch = 0.635 ton per square inch.
1 Kilogramme per square centimetre = 14.2232 lbs. per square inch.
1 Gramme per square millimetre = 1.422 lbs. per square inch.
1 Kilogrammetre = 7.233 foot-pounds.
1 Gramme per square centimetre = 0.01422 lb. per square inch.
1 Calorie or French unit of heat = 3.968 British Thermal Units.
French mechanical equivalent of heat (425 kilogrammetres) = 3,074 foot-pounds per unit.
1 Calorie per square metre = 0.369 heat-unit per square foot.
1 Calorie per kilogramme = 1.800 heat-units per lb.
English unit of heat, or heat-unit = 0.252 calorie.
English mechanical equivalent to one heat-unit (778 foot-pounds) = 10.67 kilogrammetres.
1 English heat-unit per square foot = 2.713 calories per square metre.
1 English heat-unit per lb. = 5.9 calorie per kilogramme.

Index to Tables and Data appears on Pages 27 to 30.

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STORAGE BATTERY CHARGING AND DISCHARGING

The positive plate of a lead-storage battery during charge absorbs oxygen gas turning a brown color (Peroxide of Lead, PbO_2) during the process, while the negative is reduced by the hydrogen, changing to a dull gray or slate color—spongy lead.

During discharge the positive plate parts with some of its oxygen and being gradually reduced to a lower oxide of lead is attacked by the sulphric acid, forming lead sulphate, $PbSO_4$, while the negative plate gives up some of its hydrogen and is also gradually attacked by the acid, forming lead sulphate too. Meanwhile the density of the electrolyte has become less, owing to the formation of water from the H_2O set free from the plates.

This formation of a film of sulphate on both plates brings them both to a state of balance, and the electromotive force of the battery will fall in proportion to the amount of sulphate abstracted from the acid until only water is left. In practice, the voltage should not be allowed to drop below 1.7 volts, for the reason that the excessive sulphate is almost impossible to remove entirely, and as it is to a considerable extent an insulator it causes a lowering of the voltage of the cell. When discharged the plates will be found to have changed their color somewhat again, both becoming of a lighter shade.

On charging again, both plates give up their sulphate, which returns to the acid, increasing its density to its normal condition as before—the positive plate becoming lead peroxide and the negative, spongy lead, until the cell is fully charged. The sequence of operations might aptly be termed the battery cycle.

This may be better represented in the form of an equation, thus:

BATTERY FULLY CHARGED

Positive Plates	Electrolyte	Negative Plates
PbO_2	H_2SO_4 Sp.Gr. 1.275 (Strong)	Pb

HALF DISCHARGED

$PbO_2 + PbSO_4$	H_2SO_4 Sp. Gr. 1.240 (Medium)	$Pb + PbSO_4$

FULLY DISCHARGED

$PbSO_4$	H_2SO_4 Sp. Gr. 1.180 (Weak)	$PbSO_4$

Where PbO_2 represents the chemical symbol for lead peroxide or dioxide.
Where $PbSO_4$ represents the chemical symbol for lead sulphate.
Where H_2SO_4 represents the chemical symbol for sulphuric acid.

REVERSIBLE CHEMICAL EQUATIONS SHOWING CHANGES WHICH TAKE PLACE IN THE LEAD STORAGE BATTERY (LAMAR LYNDON)

CHARGE

$\longleftarrow$

(a) $PbO_2 + H_2SO_4 = PbSO_4 + H_2O + O$
(b) $Pb + H_2SO_4 = PbSO_4 + H_2$

(c) $c = (a) + (b) = PbO_2 + Pb + {}_2H_2SO_4 = {}_2PbSO_4 + {}_2H_2O$ (2)

$\longrightarrow$

DISCHARGE

Equation (*a*) expresses the reactions at the positive plate; (*b*) those at the negative d (*c*) the combined effect is the fundamental equation of the lead storage battery.

Index to Tables and Data appears on Pages 27 to 30.

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USEFUL ENGINEERING DATA

Water weighs 62.4 pounds per cubic foot, and 8.3 pounds per gallon.

There are 7.5 gallons in a cubic foot of water.

Gasoline has a specific gravity of .72, and consequently weighs 5.96 pounds per gallon. This applies to 76° gasoline.

A foot-pound represents the work required to raise a weight of one pound to a height of one foot. There are 33,000 foot-pounds to a horsepower.

A British Thermal Unit represents the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near 39° F. Its symbol is B. T. U.

There are 778 foot-pounds in a B. T. U.

There are 42.4 B. T. U. to a horsepower.

The thermal efficiency of a good internal combustion motor is from 30 to 35 per cent.

The mechanical efficiency of a good internal combustion motor should be between 85 and 90 per cent.

On direct drive, with an efficient transmission and differential, about 88 per cent. of the power furnished by the motor should be delivered at the rear wheels.

Under the best conditions, about 75 per cent. of the indicated horsepower of the engine should be available for useful work.

If the work performed at the rear wheels is reduced to heat units, it will be found that about 23 per cent. of the energy represented by the heating value of the fuel is available as useful work.

The piston speed of a motor should not exceed 1,000 feet per minute.

The peripheral velocity of a cast iron flywheel should not exceed 5,000 feet per minute. Should it exceed this speed, there would be danger of the flywheel bursting from centrifugal force.

USEFUL FUNCTIONS OF π

$\pi = 3.14159265$	$\frac{\pi}{7} = 0.44879895$	$\pi^2 = 9.86960440$	$\sqrt{\pi} = 1.77245385$
$\frac{\pi}{2} = 1.57079633$	$\frac{\pi}{16} = 0.19634954$	$\pi^3 = 31.00627668$	$\sqrt{\pi} = 1.46459189$
$\frac{\pi}{3} = 1.04719755$	$\frac{\pi}{24} = 0.13089969$	$\frac{1}{\pi} = 0.31830989$	$\frac{1}{\sqrt{\pi}} = 0.56418958$
$\frac{\pi}{4} = 0.78539816$	$\frac{\pi}{32} = 0.09817477$	$\frac{1}{\pi^2} = 0.10132118$	$\frac{1}{\sqrt[3]{\pi}} = 0.68278406$
$\frac{\pi}{6} = 0.52359878$	$\frac{\pi}{180} = 0.01754329$	$\frac{1}{\pi^3} = 0.03225153$	$\text{Log } \pi = 0.49714987$

Index to Tables and Data appears on Pages 27 to 30.

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HEAT LOSSES DUE TO INCOMPLETE COMBUSTION IN GASOLINE MOTORS

Assuming that it were possible to secure complete combustion of the fuel, the result would be,

Carbon dioxide (CO_2) and water (H_2O).

With incomplete combustion the carbon is usually burned to carbon monoxide (CO) only, with consequent serious heat loss as the following table shows:

PRODUCTS OF COMBUSTION, FULL AND PARTIALLY LOADED

	Full Load	Partial Load	Slow Free
Carbon monoxide	3.13	6.9	——
Hydrogen	1.19	2.4	——
Hydrocarbons	0.30	0.9	——
Carbon dioxide	11.90	9.9	6.3
Oxygen	.23	0.3	11.2
Nitrogen	83.33	79.6	82.5
Total	100.0	100.0	100.0

Fuel value of carbon burned to carbon monoxide ..... =4,400 B.T.U.
Fuel value of carbon burned to carbon dioxide ..... =14,500 B.T.U.
Fuel value of hydrogen gas to water ..... =62,032 B.T.U.
Fuel value of hydrocarbon fuels to carbon dioxide ..... =20,000 B.T.U.

If we assume that the total as above given is 100 pounds and taking the fuel values as above set down for the respective elements and compounds, it will be possible to show that the loss will be enormous if the combustion is incomplete, as, for illustration, 6.9 pounds of carbon monoxide (shown at the top of the column for partial load) would mean a loss of 62,790 British thermal units of heat (B.T.U.). What is more to the point, the 2.4 pounds of hydrogen would mean a loss of 148,877 B.T.U. In the same way, all the losses may be determined.

COMBUSTION CONSTANTS OF VARIOUS GASES AND FUELS

	Atomic Weight Hydrogen=1	Molecular Weight H_2 = 2	Specific Gravity at 32° F. and Atmospheric Pressure Water=1	Density in Pounds per Cubic Foot	Specific Heat at Constant Pressure	Specific Heat at Constant Volume	Coefficient of Expansion of Volume at Constant Pressure per Deg. Centigrade	Coefficient of Expansion of Volume at Constant Pressure per Deg. Fahrenheit	British Thermal Units Given Out During Combustion with Oxygen
Air	.....	.....	.00130	.0809	.2377	.1690	.003665	.002036	.....
Carbon	11.97	.....	2.33	.....	.2411	.....	.....	.....	14,540
Carbonic acid gas	.....	CO^2 43.89	.00198	.1225	.2164	.1535	.003688	.002049	.....
Carbonic oxide	.....	CO 27.93	.00126	.0784	.2479	.1758	.003667	.002037	4,370
Coal gas (average)	.....	.....	.00054	.0335	.....	.....	.....	.....	17,800
Hydrogen	1	H_2 – 2	.00009	.0056	3.4046	2.414	.003667	.002037	61,260
Methane	.....	CH_4 15.97	.00072	.0448	.5929	.4701	.....	.....	26,400
Oxygen	15.96	O_2 31.92	.00144	.0896	.2182	.156	.....	.....	.....
Steam at 212° F.	.....	H_2O 17.96	.0008	.05	.4750	.34	.....	.....	.....
Refined petroleum	.....	.....	.8	.....	.....	.....	.....	.....	22,000
Crude petroleum	.....	.....	.9	.....	.....	.....	.....	.....	20,000

Specific heat of gas engine exhaust gases = .258 at constant pressure and .189 at constant volume.

Index to Tables and Data appears on Pages 27 to 30.

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COMPARATIVE TABLE OF FUEL COSTS FOR DIFFERENT MOTIVE POWERS

(Published by Farm Implement News)

Kind of Motive Power.	Rate of Fuel Consumed.	COST OF FUEL PER BRAKE TEST HORSE POWER																			
		For 1 Hour					For 24 Hours					For 300 Days of 10 Hours					For 300 Days of 24 Hours				
		Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at				
Gas Engine on Producer Gas.	In lbs. per h.p. per hour.	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00
	.8	$c.12	$c.16	$c.20	$c.24	$c.28	c 2.9	c 3.9	c 4.8	c 5.76	c 6.72	$3.60	$4.80	$6.00	$7.21	$8.40	$8.64	$11.52	$14.40	$17.29	$20.16
	1.00	.15	.20	.25	.30	.35	3.6	4.8	6.0	7.20	8.40	4.50	6.00	7.50	9.00	10.50	10.80	14.40	18.00	21.61	25.20
	1.25	.19	.25	.31	.38	.44	4.5	6.0	7.5	9.00	10.50	5.63	7.50	9.37	11.24	13.12	13.50	18.00	22.50	27.00	31.50
	1.50	.23	.30	.38	.45	.53	5.4	7.2	9.0	10.80	12.60	6.75	9.00	11.25	13.50	15.75	16.20	21.60	27.00	32.41	37.80
		Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at				
Gas Engine on Natural Gas.	In cu.ft. per h.p. per hour.	15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.
	9	c .14	c .18	c .23	c .27	c .32	c 3.2	c 4.3	c 5.4	c 6.5	c 7.6	$4.05	$5.40	$6.75	$8.10	$9.45	$9.72	$12.96	$15.20	$19.44	$23.68
	10	.15	.20	.25	.30	.35	3.6	4.8	6.0	7.2	8.4	4.50	6.00	7.50	9.00	10.50	10.80	14.40	18.00	21.60	25.20
	11	.17	.22	.28	.33	.39	4.0	5.3	6.6	7.9	9.2	4.95	6.60	8.25	9.90	11.55	11.88	15.84	19.80	23.76	27.72
	12	.18	.24	.30	.36	.42	4.3	5.8	7.2	8.6	10.0	5.40	7.20	9.00	10.80	12.60	12.96	17.28	21.60	25.92	30.24
		Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at				
Gas Engine on Artificial (Illuminating) Gas.	In cu.ft. per h.p. per hour.	60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00
	15	c .90	c 1.05	c 1.20	c 1.35	c 1.50	c 21.6	c 25.2	c 28.8	c 32.4	c 36.0	$27.00	$31.50	$36.00	$40.50	$45.00	$64.80	$75.60	$86.40	$97.20	$108.00
	17	1.02	1.39	1.36	1.53	1.70	24.5	28.6	32.6	36.7	40.8	30.60	35.70	40.80	45.90	51.00	73.50	85.68	97.80	110.10	122.40
	20	1.20	1.40	1.60	1.80	2.00	28.8	32.8	38.4	43.2	48.0	36.00	42.00	48.00	54.00	60.00	86.40	98.00	115.20	129.60	140.00
		Gasoline per Gallon at					Gasoline per Gallon at					Gasoline per Gallon at					Gasoline per Gallon at				
Gasoline Engine.	In pints per h.p. per hour.	10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.
	.80	c 1.00	c 1.20	c 1.40	c 1.60	c 1.80	c 24.0	c 28.8	c 33.6	c 38.4	c 43.2	$30.00	$36.00	$42.00	$48.00	$54.00	$72.00	$80.40	$97.80	$115.20	$129.60
	1.00	1.25	1.50	1.75	2.00	2.25	30.0	36.0	42.0	48.0	54.0	37.50	45.00	52.50	60.00	67.50	90.00	108.00	126.00	144.00	162.00
	1.10	1.37	1.65	1.92	2.20	2.47	33.0	39.6	46.2	52.8	59.4	41.25	49.50	57.75	66.00	74.25	99.00	118.80	138.60	158.40	178.20
		Electricity per K.W. hour at					Electricity per K.W. hour at					Electricity per K.W. hour at					Electricity per K.W. hour at				
Electric Motor (85% efficiency of wiring) 746 w = h.p.	In K. W. per h.p. per hour.	2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.
	.878	c 1.75	c 2.63	c 3.51	c 4.39	c 6.14	c 42	c 63	c 84	$1.06	$1.48	$52.68	$79.02	105.36	131.70	184.38	126.60	189.90	253.20	316.50	443.10
		Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb Ton at				
Steam Engine on Coal.	In lbs. per h.p. per hour.	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00
	4	c .60	c .80	c 1.00	c 1.20	c 1.40	c 14.4	c 19.2	c 24.0	c 28.8	c 33.6	$18.00	$24.00	$30.00	$36.00	$42.00	$43.20	$57.60	$72.00	$86.40	$100.80
	6	.90	1.20	1.50	1.80	2.10	21.6	28.8	36.0	43.2	50.4	27.00	36.00	45.00	54.00	63.00	64.80	86.40	108.00	129.60	151.20
	8	1.20	1.60	2.00	2.40	2.80	28.8	38.4	48.0	57.6	67.2	36.00	48.00	60.00	72.00	84.00	86.40	115.20	144.00	172.80	201.60
	10	1.50	2.00	2.50	3.00	3.50	36.0	48.0	60.0	72.0	84.0	45.00	60.00	75.00	90.00	105.00	108.00	144.00	180.00	216.00	252.00

Index to Tables and Data appears on Pages 27 to 30.

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PROPORTIONS OF ATMOSPHERIC AIR

(1) To find the quantity of nitrogen by volume corresponding to one volume of oxygen, multiply by 3.77092.

(2) To find the quantity of oxygen by volume corresponding to one volume of nitrogen, multiply by 0.265182.

(3) To find the quantity of nitrogen by weight corresponding to one part by weight of oxygen, multiply by 3.313022.

(4) To find the quantity of oxygen by weight corresponding to one part by weight of nitrogen, multiply by 0.301839.

(5) To find the quantity of nitrogen by volume corresponding to one part by weight of oxygen, multiply by 2.6365411.

(6) To find the quantity of oxygen by volume corresponding to one part by weight of nitrogen, multiply by 0.2730071.

(7) To find the quantity of nitrogen by weight corresponding to one part by volume of oxygen, multiply by 3.6629154.

(8) To find the quantity of oxygen by weight corresponding to one part by volume of nitrogen, multiply by 0.3792848.

Formula for correcting the volume of gases for temperature and pressure:

$$\frac{V}{V^1} = \frac{(273+t)P^1}{273+t^1P}.$$

When,

V = original volume;
V^1 = corrected volume;
t = original temperature in degrees Centigrade;
t^1 = final temperature in degrees Centigrade;
P = original pressure;
P^1 = final pressure;
273 = absolute temperature in degrees Centigrade.

Absolute temperature, if measured in Fahrenheit units, instead of in Centigrade as above given, would be 491.13 below the melting point of ice. The volume of a perfect gas increases 1/273 of its volume at 0 degrees Centigrade for every increase of 1 degree on the same scale. According to this, absolute zero corresponds to the temperature at which the same perfect gas would reduce to nothing.

RELATION OF GASOLINE VAPOR TO AIR

In any discussion of the relation of gasoline to atmospheric air, it becomes necessary to carefully distinguish as between vaporized and liquid gasoline. With air at 60 degrees Fahrenheit, about 15 per cent. of true gasoline vapor will produce a state of saturation. Such a mixture would be non-explosive, and in practice the following holds:

Volumes of Gasoline Vapor in Per Cent. of Air Volumes	*Volumes of Atmospheric Air at 60° F. Corresponding	
15.0	.....	Saturation point of air at 60° F.
5.5	3,400	Too rich to serve for the purpose
4.0	4,000	Uncertain in its action.
....	5,000	.....
....	6,000	.....
....	7,000	.....
2.4	8,000	Suitable for the best results.
....	9,000	.....
1.9	10,000	Too uncertain to be of value.

* In the above table the volumes of air relate to one volume of liquid gasoline, whereas the vapor volumes are in percentage of the air volumes used in each case. Absolutely accurate determinations will depend upon the mixture being of a definite character.

Index to Tables and Data appears on Pages 27 to 30.

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PROPERTIES OF GASOLINE AND DENATURED ALCOHOL (MUNTZ)

Properties	Gasoline	Denatured Alcohol
Carbon	84.3 per cent.	41.5 per cent.
Hydrogen	15.7 per cent.	13.0 per cent.
Oxygen	.....	45.5 per cent.
Density at 15° C	.708	.834
Boiling point	88° C.	78.5° C.
Calories per Kg	*11,359.65	‡6,521.75
Weight evaporated per hour per dm.² (15.5 sq. in.) of surface:		
1. In experiment room 18° C	9.37 g. (0.33 oz.)	3.47 g. (0.12 oz.)
2. Outside in the sun; 25° C	47.21 g. (1.66 oz.)	27.08 g. (0.95 oz.)

* 20,488 British heat units per lb. ‡ 11,762 British heat units per lb.

TESTS WITH BRITISH MOTOR FUEL

GASOLINE AND BENZOL TESTS

Six-Cylinder Napier Engine

	Specific Gravity	Temperature of Testing Room Fahr.	Average of Three Tests, B.H.P.	Remarks
Ordinary gasoline	.687	67.1	64.25	
" "	.699	69.8	64.4	
" "	.713	65.3	64.4	
" "	.714	60.8	65.5	
" "	.759	67.1	63.5	
Benzol	.873	75.2	64.1	Exhaust has a sulphurous, pungent smell. Engine started quite easily.

PROPERTIES OF GASES

(1*)	(2*)	(3*)	(4*)	(5*)
Hydrogen	H	.0692	.00559	52230
Oxygen	O	1.106	.08921	.....
Nitrogen	N	.971	.07831	.....
Carbon Monoxide	CO	.967	.07807	4380
Carbon Dioxide	CO_2	1.529	.12267	.....
Dry Air	.....	1.000	.08072	.....
Water Vapor	H_2O	.625	.05020	.....
Acetylene	C_2H_2	.915	.07251	20673
Methane	CH_4	.554	.04464	21385
Ethylene	C_2H_4	.974	.07805	20025
Alcohol	C_2H_6O	1.601	.12598	12000

*1 Gases.
*2 Chemical Formula or Symbol.
*3 Density (Air = 1).
*4 Weight per cubic foot under standard conditions.
*5 Heating values per pound in B. T. U.

Index to Tables and Data appears on Pages 27 to 30.

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SPECIFIC HEAT OF HYDROCARBONS

In order to be able to estimate the losses in the exhaust of a motor it is necessary to know the specific heat of the elements and compounds determined by analysis of the exhaust, together with the range of temperatures, as well as the weight of the exhaust gases. The specific heat values are as follows:

Elements and Compounds	Specific Heat
Carbon	0.241
Carbon monoxide	0.2479
Oxygen	0.218
Hydrogen	0.244
Nitrogen (approximately)	0.240

Since over 80 per cent. of the whole weight of gas (mixture) will be nitrogen, it follows that much of the heat lost to the exhaust is taken away in the nitrogen. This fact, coupled with the absence of heat value, in nitrogen, tends to the contention that nitrogen is an evil without a recompense. In the absence of nitrogen, however, the fuel would be so quick-burning that the pistons would not be capable of receding rapidly enough to enable the functions to be performed, and it follows that some element has to be present, the nature of which will serve to dampen the rate of flame propagation. Nitrogen is at hand in the right proportion and the cost of its provision is therefore nil, since, as exemplified above, it has no heat value.

PROPERTIES OF SOME OF THE CONSTITUENTS OF GASOLINE

Name	Per Cent. of Carbon	Per Cent. of Hydrogen	Boiling Point—Fahr.	Specific Gravity	Vapor Density
Pentane	83.20	16.71	87	.640	2.538
Hexane	83.68	16.32	143	.676	3.053
Heptane	83.90	16.04	165	.718	3.547

PROPORTIONS OF HYDROGEN AND CARBON IN FUELS

Commercial Names of Fuels	Hydrogen by Weight	Carbon by Weight
Gasoline	16	84
Benzine	8	92
Kerosene	15	85
Tar benzol	8	92
*Grain Alcohol	8	32

*Alcohol, in addition to carbon and hydrogen, holds 50 per cent. of oxygen.

Index to Tables and Data appears on Pages 27 to 30.

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CAPACITY OF ATMOSPHERIC AIR FOR VAPOR AT DIFFERENT TEMPERATURES

Temperature in Degrees Fahrenheit	Pounds per Cubic Feet Dry Air	Pounds of Vapor in One Pound of Air	Weight in Pounds, Cubic Feet Saturated Air	Vapor in Air	A | V
32	0.0807	0.00379	0.0802	0.000304	263.7
42	0.0791	0.00561	0.0784	0.000440	178.18
52	0.0776	0.00819	0.0766	0.000627	122.
62	0.0761	0.01179	0.0747	0.000881	85.
72	0.0747	0.01680	0.0727	0.001221	59.5
82	0.0733	0.02361	0.0706	0.001667	42.3
92	0.0720	0.03289	0.0684	0.002250	30.3
102	0.0707	0.04547	0.0659	0.002997	22.

VISCOSITY OF GASOLINE

In considering the functioning of the gasoline carbureter, changes in viscosity of the fuel due to differences in temperature should be considered. It is a mistake to assume that because gasoline does not noticeably thicken up at the lower atmospheric temperatures (usual in the Northern States in winter) it will flow through the nozzle of a carbureter at the same rate under all heat conditions. Taking gasoline of a specific gravity of 0.71, it has been shown by experiment that the amount which will pass through a nozzle of a carbureter under a given pressure will increase as the temperature is increased in the following manner:

Temperature in ° F.	50	59	68	77	86	95
Relative flow	1	1.073	1.145	1.212	1.27	1.335

Since nozzles in carbureters are not readily adjustable, and with any degree of certainty, it follows that such a great difference in the weight of fuel ejected, considering the differences in temperature named, is bound to lead to a certain amount of carbureter inefficiency of the kind which does not readily yield to treatment.

The following table gives the density and viscosity (expressed in C. G. S. units) of gasoline at different temperatures centigrade.

Density at 15 Degrees Centigrade	Viscosity at 5 Degrees Centigrade	15 Degrees Centigrade	25 Degrees Centigrade
0.680*	0.00376	0.00342	0.00319
0.684	0.00380	0.00352	0.00332
0.704	0.00406	0.00380	0.00359
0.707	0.00445	0.00420	0.00398
0.714	0.00431	0.00404	0.00385
0.719	0.00445	0.00420	0.00398
0.720	0.00450	0.00421	0.00400
0.721	0.00454	0.00421	0.00400
0.725	0.00486	0.00454	0.00430

*Hexane.

Index to Tables and Data appears on Pages 27 to 30.

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CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF VARIOUS SUBSTANCES THAT HAVE A HEAT VALUE

Fuel	Chemical Proportions	Weight of Gas at 30°, per Cubic Foot	Volume of 1 Pound of Gas at Atmospheric Pressure		Volume Required to Burn 1 Cubic Foot of Gas		Weight Required to Burn 1 Pound of Gas		Specific Heat of Gas at Constant Pressure	Heat of Combustion	
		Pound	Cubic Feet		Cubic Feet		Pounds			B.T.U. per Pound of Fuel	B.T.U. per Cubic Foot of Gas at 62°
			32°	62°	O	Air	O	Air			
Oxygen, O	23 lb. O + 77 lb. N = 100 lb. air	.08927	11.20	11.88	...	.....	....	.....	.21751	.....	.....
Nitrogen, N	21 vol. O + 79 vol. N = 100 vol. air	.07847	12.77	13.55	...	.....	....	.....	.24380	.....	.....
Hyrdogen, H	$2H + O = H_2O$	.00562	178.80	189.80	.5	2.38	8.00	34.80	3.40900	62,000	327
Carbon, C	$C + O = CO$	.....	.....	.....	...	.....	....	.....	.....	4,400	.....
Carbon, C	$C + 2O = CO_2$	.....	.....	.....	...	.....	....	.....	.....	14,600	.....
Carbon monoxide, CO	$CO + O = CO_2$	.07704	12.77	13.55	.5	2.38	.57	2.48	.24790	.....	324
Carbon dioxide, CO_2	1 lb. C + 2.66 lb. O = 3.66 lb. CO_2	.12323	8.12	8.60	...	.....	....	.....	.21700	4,385	.....
Methane (marsh gas), CH_4	$CH_4 + 4O = 2H_2O + CO_2$	.04538	22.37	23.73	2.0	9.52	4.00	17.40	.59290	23,976	1,010
Ethylene (olefiant gas), C_2H_4	$C_2H_4 + 6O = 2H_2O + 2CO_2$	.07830	12.77	13.55	3.0	14.28	3.43	14.90	.40400	21,476	1,585
Ethane, C_2H_6	$C_2H_6 + 7O = 3H_2O + 2CO_2$	.08369	11.94	12.67	3.5	16.66	....	.....	.....	22,356	1,765
Benzol vapors, C_6H_6	$C_6H_6 + 15O = 3H_2O + 6CO_2$	.22363	4.47	4.74	7.5	35.7	....	.....	.37540	18,183	3,836
Acetylene, C_2H_2	$C_2H_2 + 5O = H_2O + 2CO_2$	.07251	13.79	14.63	2.5	11.9	....	.....	.....	21,421	1,464

Index to Tables and Data appears on Pages 27 to 30.

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MOLECULAR WEIGHT OF PETROLEUM DISTILLATES

The atomic weight of the elements entering into the fractions may be set down thus:

Hydrogen..... 1
Carbon..... 12
Oxygen..... 16

The molecular weight may be found as follows:

(*a*) butane, $C_4H_{10} = 4 \times 12 + 10 \times 1 = 58$;
(*b*) pentane, $C_5H_{12} = 5 \times 12 + 12 \times 1 = 72$;
(*c*) hexane, $C_6H_{14} = 6 \times 12 + 14 \times 1 = 86$;
(*d*) heptane, $C_7H_{16} = 7 \times 12 + 16 \times 1 = 100$;
(*e*) octane, $C_8H_{18} = 8 \times 12 + 18 \times 1 = 114$;
(*f*) nonane, $C_9H_{20} = 9 \times 12 + 20 \times 1 = 128$;
(*g*) decane, $C_{10}H_{22} = 10 \times 12 + 22 \times 1 = 142$.

In like manner the molecular weight of any of the compounds may be found, the rule for which may be stated as follows:

Multiply the atomic weight of each element by the number of atoms for each element and the sum of the respective products will be the molecular weight of the resultant compound.

In general practice it has been the custom to consider that gasoline was largely hexane, the molecular weight of which was taken in the further determinations. It is highly improbable that this method will serve, for the reason that hexane is not now used to the same extent as formerly and the chances are that heptane and octane will have to be taken into account.

TABLE OF APPROXIMATE CAPACITIES IN LIQUID GALLONS

1	2	3	4	5	6	7	8	9	10	Gallons	Gal'ns per Inch
5x12	6x18	6x24	6x36	6x42						6" diam'r	.122
	7x12	7x18	7x24	7x30	7x36	7x42	7x48			7" "	.165
		8x15	8x18	8x24	8x30	8x36	8x42	8x45	8x48	8" "	.217
		9x12	9x15	9x18	9x24	9x30	9x34	9x36	9x40	9" "	.275
					10x20	10x24	10x26	10x28	10x32	10" "	.340
						12x16	12x18	12x20	12x24	12" "	.486

10	15	20	25	30	35	40	45	50	Gallons	Gal'ns per Inch
8x48									8" diam'r	.217
9x40									9" "	.275
10x32	10x48								10" "	.340
12x24	12x34	12x42	12x50	12x60					12" "	.486
14x18	14x24	14x30	14x38	14x44	14x52	14x60			14" "	.666
	16x18	16x24	16x30	16x36	16x42	16x48	16x54	16x60	16" "	.870

Index to Tables and Data appears on Pages 27 to 30.

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MEASURING THE CONTENTS OF HORIZONTAL CYLINDRICAL TANKS

In a horizontally disposed cylindrical tank the contents cannot be measured without the knowledge of certain geometrical relations existing between the height at which the liquid stands and the volume it occupies. These are given hereafter: 1st, In relation of volume to height; 2nd, In relation of height to volume.

V = total volume of tank;
v = volume occupied by liquid;
D = diameter of tank;
h = height of liquid in tank.

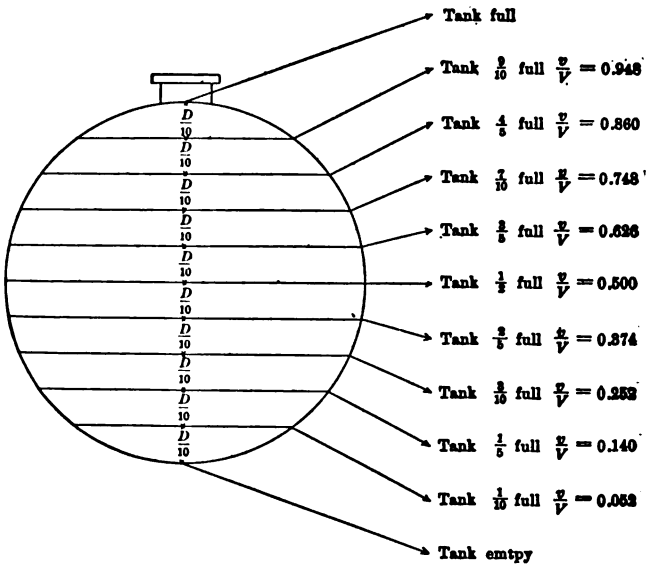

Fig. 1 -Tank divided into 10 parts of equal height. (Case in which measurement is taken with an ordinary foot rule.)

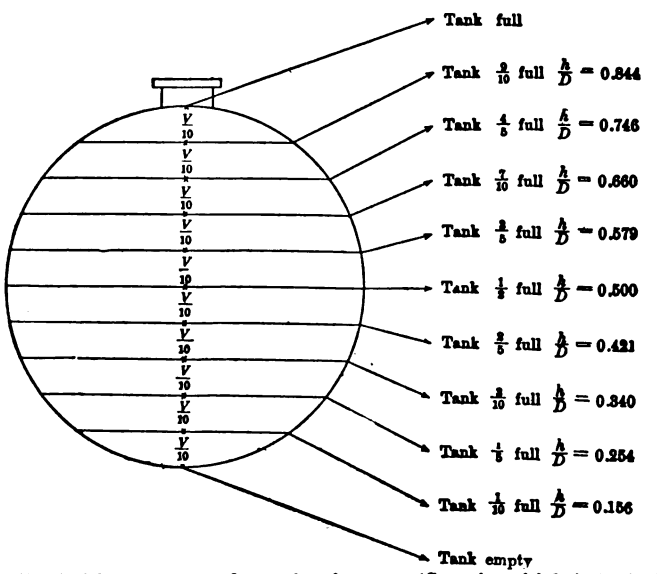

Fig. 2.—Tank divided in 10 parts of equal volume. (Case in which it is desired to make a gauge for a given tank.)

Index to Tables and Data appears on Pages 27 to 30.

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TABLE FOR THE DIVISION OF THE CIRCUMFERENCE

Number of Divisions in the Circumference	Angle of Corresponding Division of Circle; Degrees	Length of Chord in Decimal Fraction of Radius	Number of Divisions in the Circumference	Angle of Corresponding Division of Circle; Degrees	Length of Chord in Decimal Fraction of Radius
3	120	1.73206	52	6.55	0.120356
4	90	1.41422	53	6.47	0.118032
5	72	1.17558	54	6.40	0.11629
6	60	1	55	6.32	0.113966
7	51.25	0.86732	56	6.25	0.111644
8	45	0.76536	57	6.18	0.1099
9	40	0.68404	58	6.12	0.108158
10	36	0.61804	59	6.06	0.106414
11	32.43	0.563	60	6	0.104672
12	30	0.51764	61	5.54	0.102928
13	27	0.4782	62	5.48	0.101186
14	25	0.4448	63	5.42	0.099442
15	24	0.41582	64	5.37	0.0977
16	22.30	0.39018	65	5.32	0.096538
17	21.10	0.36734	66	5.27	0.094794
18	20	0.3473	67	5.22	0.093632
19	18.56	0.32894	68	5.17	0.091888
20	18	0.31286	69	5.13	0.090765
21	17.08	0.29792	70	5.08	0.089564
22	16.21	0.2841	71	5.04	0.088402
23	15.39	0.272	72	5	0.087238
24	15	0.26106	73	4.55	0.085496
25	14.24	0.25066	74	4.51	0.084332
26	13.50	0.24086	75	4.48	0.083752
27	13.20	0.23218	76	4.44	0.083588
28	12.51	0.22352	77	4.40	0.081426
29	12.24	0.216	78	4.36	0.080264
30	12	0.20906	79	4.33	0.0791
31	11.36	0.20212	80	4.30	0.078518
32	11.15	0.19574	81	4.26	0.077356
33	10.54	0.18996	82	4.23	0.076194
34	10.35	0.18416	83	4.20	0.075612
35	10.17	0.17894	84	4.17	0.07445
36	10	0.17432	85	4.14	0.073868
37	9.43	0.1691	86	4.11	0.072706
38	9.28	0.16504	87	4.08	0.072124
39	9.13	0.1604	88	4.05	0.070962
40	9	0.15692	89	4.02	0.07038
41	8.46	0.15286	90	4.	0.069798
42	8.34	0.14938	91	3.57	0.0686362
43	8.22	0.1459	92	3.54	0.0680546
44	8.10	0.14242	93	3.52	0.0674732
45	8	0.13952	94	3.49	0.0663104
46	7.49	0.13603	95	3.47	0.0657288
47	7.39	0.133128	96	3.45	0.0651474
48	7.30	0.130806	97	3.42	0.064566
49	7.20	0.127904	98	3.40	0.0639844
50	7.12	0.125582	99	3.38	0.63403
51	7.03	0.122678	100	3.36	0.0628216

This table should be useful for gear and chain wheel calculation and design

Index to Tables and Data appears on Pages 27 to 30.

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CIRCUMFERENCES AND AREAS OF CIRCLES

ADVANCING BY EIGHTHS

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
1/64	.04909	.00019	2 3/8	7.4613	4.4301	6 1/8	19.242	29.465
1/32	.09818	.00077	7/16	7.6576	4.6664	1/4	19.635	30.680
3/64	.14726	.00173	1/2	7.8540	4.9087	3/8	20.028	31.919
1/16	.19635	.00307	9/16	8.0503	5.1572	1/2	20.420	33.183
3/32	.29452	.00690	5/8	8.2467	5.4119	5/8	20.813	34.472
1/8	.39270	.01227	11/16	8.4430	5.6727	3/4	21.206	35.785
5/32	.49087	.01917	3/4	8.6394	5.9396	7/8	21.598	37.122
3/16	.58905	.02761	13/16	8.8357	6.2126	7	21.991	38.485
7/32	.68722	.03758	7/8	9.0321	6.4918	1/8	22.384	39.871
			15/16	9.2284	6.7771	1/4	22.776	41.282
1/4	.78540	.04909				3/8	23.169	42.718
9/32	.88357	.06213	3	9.4284	7.0686	1/2	23.562	44.179
5/16	.98175	.07670	1/16	9.6211	7.3662	5/8	23.955	45.664
11/32	1.0799	.09281	1/8	9.8175	7.6699	3/4	24.347	47.173
3/8	1.1781	.11045	3/16	10.014	7.9798	7/8	24.740	48.707
13/32	1.2763	.12962	1/4	10.210	8.2958	8	25.133	50.265
7/16	1.3744	.15033	5/16	10.407	8.6179	1/8	25.525	51.849
15/32	1.4726	.17257	3/8	10.603	8.9462	1/4	25.918	53.456
			7/16	10.799	9.2806	3/8	26.311	55.088
1/2	1.5708	.19635	1/2	10.996	9.6211	1/2	26.704	56.745
17/32	1.6690	.22166	9/16	11.192	9.9678	5/8	27.096	58.426
9/16	1.7671	.24850	5/8	11.388	10.321	3/4	27.489	60.132
19/32	1.8653	.27688	11/16	11.585	10.680	7/8	27.882	61.862
5/8	1.9635	.30680	3/4	11.781	11.045	9	28.274	63.617
21/32	2.0617	.33824	13/16	11.977	11.416	1/8	28.667	65.397
11/16	2.1598	.37122	7/8	12.174	11.793	1/4	29.060	67.201
23/32	2.2580	.40574	15/16	12.370	12.177	3/8	29.452	69.029
			4	12.566	12.566	1/2	29.845	70.882
3/4	2.3562	.44179	1/16	12.763	12.962	5/8	30.238	72.760
25/32	2.4544	.47937	1/8	12.959	13.364	3/4	30.631	74.662
13/16	2.5525	.51849	3/16	13.155	13.772	7/8	31.023	76.589
27/32	2.6507	.55914	1/4	13.352	14.186	10	31.416	78.540
7/8	2.7489	.60132	5/16	13.548	14.607	1/8	31.809	80.516
29/32	2.8471	.64504	3/8	13.744	15.033	1/4	32.201	82.516
15/16	2.9452	.69029	7/16	13.941	15.466	3/8	32.594	84.541
31/32	3.0434	.73708	1/2	14.137	15.904	1/2	32.987	86.590
			9/16	14.334	16.349	5/8	33.379	88.664
1	3.1416	.7854	5/8	14.530	16.800	3/4	33.772	90.763
1/16	3.3379	.8866	11/16	14.726	17.257	7/8	34.165	92.886
1/8	3.5343	.9940	3/4	14.923	17.728	11	34.558	95.033
3/16	3.7306	1.1075	13/16	15.119	18.190	1/8	34.950	97.205
1/4	3.9270	1.2272	7/8	15.315	18.665	1/4	35.343	99.402
5/16	4.1233	1.3530	15/16	15.512	19.147	3/8	35.736	101.62
3/8	4.3197	1.4849	5	15.708	19.635	1/2	36.128	103.87
7/16	4.5160	1.6230	1/16	15.904	20.129	5/8	36.521	106.14
1/2	4.7124	1.7671	1/8	16.101	20.629	3/4	36.914	108.43
9/16	4.9087	1.9175	3/16	16.297	21.135	7/8	37.306	110.75
5/8	5.1051	2.0739	1/4	16.493	21.648	12	37.699	113.10
11/16	5.3014	2.2365	5/16	16.690	22.166	1/8	38.092	115.47
3/4	5.4978	2.4053	3/8	16.886	22.691	1/4	38.485	117.86
13/16	5.6941	2.5802	7/16	17.082	23.221	3/8	38.877	120.28
7/8	5.8905	2.7612	1/2	17.279	23.758	1/2	39.270	122.72
15/16	6.0868	2.9483	9/16	17.475	24.301	5/8	39.663	125.19
			5/8	17.671	24.850	3/4	40.055	127.68
2	6.2832	3.1416	11/16	17.868	25.406	7/8	40.448	130.19
1/16	6.4795	3.3410	3/4	18.064	25.967	13	40.841	132.73
1/8	6.6759	3.5466	13/16	18.261	26.535	1/8	41.233	135.30
3/16	6.8722	3.7583	7/8	18.457	27.109	1/4	41.626	137.89
1/4	7.0686	3.9761	15/16	18.653	27.688	3/8	42.019	140.50
5/16	7.2649	4.2000	6	18.850	28.274	1/2	42.412	143.14

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AREAS OF SMALL CIRCLES

Diameter	Areas									
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0	.000078	.00031	.0007	.00125	.00196	.00283	.00385	.00503	.00636
.1	.0078	.0095	.0113	.0133	.0154	.0177	.0201	.0227	.0255	.0283
.2	.0314	.03464	.038	.0415	.0452	.0491	.0531	.0572	.0616	.066
.3	.0706	.0755	.0804	.0855	.0908	.0962	.1018	.1075	.1134	.1195
.4	.1256	.132	.1385	.1452	.1520	.1590	.1662	1735	.181	.1886
.5	.1963	.2043	.2124	.2206	.2290	.2376	.2463	.2552	.2642	.2734
.6	.2827	.2922	.3014	.3117	.3217	.3318	.3421	.3526	.3632	.3739
.7	.3848	.3959	.4071	.4185	.4301	.4418	.4536	.4657	.4778	.4902
.8	.5026	.5153	.5281	.5411	.5542	.5674	.5809	.5945	.6082	.6221
.9	.6362	.6504	.6648	.6793	.694	.7088	.7238	.739	.7543	.7698

DECIMAL EQUIVALENTS OF FRACTIONS OF AN INCH

1/64 = .0156	17/64 = .2656	33/64 = .5156	49/64 = .7656
1/32 = .0312	9/32 = .2812	17/32 = .5312	25/32 = .7812
3/64 = .0468	19/64 = .2968	35/64 = .5468	51/64 = .7968
1/16 = .0625	5/16 = .3125	9/16 = .5625	13/16 = .8125
5/64 = .0781	21/64 = .3281	37/64 = .5781	53/64 = .8281
3/32 = .0937	11/32 = .3437	19/32 = .5937	27/32 = .8437
7/64 = .1093	23/64 = .3593	39/64 = .6093	55/64 = .8593
1/8 = .1250	3/8 = .3750	5/8 = .6250	7/8 = .8750
9/64 = .1406	25/64 = .3906	41/64 = .6406	57/64 = .8906
5/32 = .1562	13/32 = .4062	21/32 = .6562	29/32 = .9062
11/64 = .1718	27/64 = .4218	43/64 = .6718	59/64 = .9218
3/16 = .1875	7/16 = .4375	11/16 = .6875	15/16 = .9375
13/64 = .2031	29/64 = .4531	45/64 = .7031	61/64 = .9531
7/32 = .2187	15/32 = .4687	23/32 = .7187	31/32 = .9687
15/64 = .2343	31/64 = .4843	47/64 = .7343	63/64 = .9843
1/4 = .2500	1/2 = .5000	3/4 = .7500	1 = 1.0000

Index to Tables and Data appears on Pages 27 to 30.

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THERMOMETER SCALES

There are two thermometer scales in general use in the United States: Fahrenheit and Centigrade. In the Fahrenheit thermometer the temperature of melting ice is taken at 32 degrees and boiling point at 212 degrees; thus there are 180 degrees between the two extremes. In the Centigrade thermometer the distance between these two points on the scale is divided into exactly 100 degrees. In order to convert degrees Fahrenheit into degrees Centigrade: Subtract 32, multiply the remainder by 5, and divide by 9. Thus, convert 158 degrees Fahrenheit to degrees Centigrade:

$$\text{Then } (158-32)\frac{5}{9} = 70^\circ \text{ Cent.}$$

Or to convert degrees Centigrade into degrees Fahrenheit: Multiply by 9, divide by 5 and add 32. Thus, convert 70 degrees Centigrade into degrees Fahrenheit:

$$\text{Then } (70 \times \frac{9}{5}) + 32 = 158^\circ \text{ Fahr.}$$

Following is a table giving the equivalent degrees of the Fahrenheit and Centigrade scales, from 1 to 100 Centigrade:

Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.
0	*32.0	35	95.0	70	158.0
1	33.8	36	96.8	71	159.8
2	35.6	37	98.6	72	161.6
3	37.4	38	100.4	73	163.4
4	39.2	39	102.2	74	165.2
5	41.0	40	104.0	75	167.0
6	42.8	41	105.8	76	168.8
7	44.6	42	107.6	77	170.6
8	46.4	43	109.4	78	172.4
9	48.2	44	111.2	79	174.2
10	50.0	45	113.0	80	176.0
11	51.8	46	114.8	81	177.8
12	53.6	47	116.6	82	179.6
13	55.4	48	118.4	83	181.4
14	57.2	49	120.2	84	183.2
15	59.0	50	122.0	85	185.0
16	60.8	51	123.8	86	186.8
17	62.6	52	125.6	87	188.6
18	64.4	53	127.4	88	190.4
19	66.2	54	129 2	89	192.2
20	68.0	55	131.0	90	194.0
21	69.8	56	132.8	91	195.8
22	71.6	57	134.6	92	197.6
23	73.4	58	136.4	93	199.4
24	75.2	59	138.2	94	201.2
25	77.0	60	140.0	95	203.0
26	78.8	61	141.8	96	204.8
27	80.6	62	143.6	97	206.6
28	82.4	63	145.4	98	208.4
29	84.2	64	147.2	99	210.2
30	86.0	65	149.0	100	†212.0
31	87.8	66	150.8	..	.....
32	89.6	67	152.6	..	.....
33	91.4	68	154.4	..	.....
34	93.2	69	156.2	..	.....

* Freezing point.
† Boiling point.

It will be noticed that for each degree Centigrade the Fahrenheit scale rises 1.8 degrees, so that if we multiply the degrees Centigrade by 1.8 and add 32 we will get the equivalent number of degrees Fahrenheit. In the Fahrenheit thermometer the freezing and boiling points of water are taken at the mean atmospheric pressure at the sea level, 14.7 pounds to the square inch.

Index to Tables and Data appears on Pages 27 to 30.

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FORMULAS FOR CONVERSION OF THERMOMETER SCALES

To convert degrees, Centigrade or Réaumur, into degrees Fahrenheit·
Let F = No. of degrees Fahrenheit.
C = " " " Centigrade.
R = " " " Réaumur.

$$F = \frac{9C}{5} + 32; \qquad F = \frac{9R}{4} + 32;$$

$$C = \frac{5\,(F - 32)}{9} \qquad R = \frac{4\,(F - 32)}{9}$$

Freezing point, or 32° Fah. = zero in Cent. or Réaumur.
Boiling point, or 212° Fah. = 100° Cent., or 80° Réaumur.

BAUME HYDROMETER AND SPECIFIC GRAVITY EQUIVALENTS (AMERICAN STANDARD)

For liquids heavier than water,

$$\text{Sp. Gr.} = \frac{145}{145 - {}^\circ\text{Bé}} \text{ at } 60^\circ \text{ F.}$$

Baumé	Specific Gravity	Baumé	Specific Gravity	Baumé	Specific Gravity
0.0	1.000	17.5	1.137	35.0	1.318
0.5	1.003	18.0	1.141	36.0	1.330
1.0	1.006	18.5	1.146	37.0	1.342
1.5	1.010	19.0	1.150	38.0	1.355
2.0	1.014	19.5	1.155	39.0	1.367
2.5	1.017	20.0	1.160	40.0	1.381
3.0	1.021	20.5	1.164	45.0	1.450
3.5	1.024	21.0	1.169	50.0	1.526
4.0	1.028	21.5	1.174	55.0	1.611
4.5	1.032	22.0	1.178	60.0	1.705
5.0	1.035	22.5	1.183	65.0	1.812
5.5	1.039	23.0	1.188	70.0	1.933
6.0	1.043	23.5	1.193	....	.....
6.5	1.046	24.0	1.198	....	.....
7.0	1.050	24.5	1.203	....	.....
7.5	1.054	25.0	1.208	....	.....
8.0	1.058	25.5	1.213	....	.....
8.5	1.062	26.0	1.218	....	.....
9.0	1.066	26.5	1.223	....	.....
9.5	1.070	27.0	1.228	....	.....
10.0	1.074	27.5	1.234	....	.....
10.5	1.078	28.0	1.239	....	.....
11.0	1.082	28.5	1.244	....	.....
11.5	1.086	29.0	1.250	....	.....
12.0	1.090	29.5	1.255	....	.....
12.5	1.094	30.0	1.260	....	.....
13.0	1.098	30.5	1.266	....	.....
13.5	1.102	31.0	1.271	....	.....
14.0	1.106	31.5	1.277	....	.....
14.5	1.111	32.0	1.283	....	.....
15.0	1.115	32.5	1.288	....	.....
15.5	1.119	33.0	1.294	....	.....
16.0	1.124	33.5	1.300	....	.....
16.5	1.128	34.0	1.306	....	.....
17.0	1.132	34.5	1.312	....	.....

Index to Tables and Data appears on Pages 27 to 30.

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BOILING POINT OF WATER AT VARIOUS ALTITUDES

Altitude Above Sea Level in Feet	Boiling Point of Water in Degrees Fahrenheit
1,025	212
2,063	210
3,115	208
4,169	206
5,225	204
6,304	202
7,381	200
8,431	198
9,579	196
10,685	194
	192

It is considered good practice to maintain the temperature of the water in an automobile motor cooling system at about 202 degrees Fahrenheit, under normal operating conditions. This allows a working margin, under boiling point, for adverse conditions, such as climbing a long grade, car standing with motor running idle, or running with a retarded spark. Such a system would steam when a car running under normal conditions attained an altitude of about one mile. In cases where steaming occurs under normal conditions, at sea level, mountain climbing is practically impossible or necessitates very frequent stops for water to make up for evaporation.

DECIMAL FRACTIONS OF A LINEAL INCH IN MILLIMETRES

Inch	Milli-metres	Inch	Milli-metres	Inch	Milli-metres	Inches	Milli-metres
.01	.254	.29	7.366	.57	14.478	.85	21.590
.02	.508	.30	7.620	.58	14.732	.86	21.844
.03	.762	.31	7.874	.59	14.986	.87	22.098
.04	1.016	.32	8.128	.60	15.240	.88	22.352
.05	1.270	.33	8.382	.61	15.494	.89	22.606
.06	1.254	.34	8.636	.62	15.748	.90	22.860
.07	1.778	.35	8.890	.63	16.002	.91	23.114
.08	2.032	.36	9.114	.64	16.256	.92	23.368
.09	2.286	.37	9.398	.65	16.510	.93	23.622
.10	2.540	.38	9.652	.66	16.764	.94	23.876
.11	2.794	.39	9.906	.67	17.018	.95	24.130
.12	3.048	.40	10.160	.68	17.272	.96	24.384
.13	3.302	.41	10.414	.69	17.526	.97	24.638
.14	3.556	.42	10.668	.70	17.780	.98	24.892
.15	3.810	.43	10.922	.71	18.034	.99	25.146
.16	4.064	.44	11.176	.72	18.288	1.00	25.400
.17	4.318	.45	11.430	.73	18.542	2.00	50.799
.18	4.572	.46	11.684	.74	18.796	3.00	76.199
.19	4.826	.47	11.938	.75	19.050	4.00	101.598
.20	5.080	.48	12.192	.76	19.304	5.00	126.998
.21	5.334	.49	12.446	.77	19.558	6.00	152.397
.22	5.588	.50	12.700	.78	19.812	7.00	177.797
.23	5.842	.51	12.945	.79	20.066	8.00	203.196
.24	6.096	.52	13.208	.80	20.320	9.00	228.596
.25	6.350	.53	13.462	.81	20.574	10.00	253.995
.26	6.604	.54	13.716	.82	20.828	11.00	279.395
.27	6.858	.55	13.970	.83	21.082	12.00	304.794
.28	7.112	.56	14.224	.84	21.336	1 foot	

Index to Tables and Data appears on Pages 27 to 30.

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UNITED STATES OFFICIAL MILLIMETERS CONVERSION TABLE

Millimeters	Equivalent in Inches	Millimeters	Equivalent in Inches
1	0.03,937	51	2.00,787
2	0.07,874	52	2.04,724
3	0.11,811	53	2.08,661
4	0.15,748	54	2.12,598
5	0.19,685	55	2.16,535
6	0.23,622	56	2.20,472
7	0.27,559	57	2.24,409
8	0.31,496	58	2.28,346
9	0.35,433	59	2.32,283
10	0.39,370	60	2.36,220
11	0.43,307	61	2.40,157
12	0.47,244	62	2.44,094
13	0.51,181	63	2.48,031
14	0.55,118	64	2.51,968
15	0.59,055	65	2.55,905
16	0.62,992	66	2.59,842
17	0.66,929	67	2.63,779
18	0.70,866	68	2.67,716
19	0.74,803	69	2·71,653
20	0.78,740	70	2.75,590
21	0.82,677	71	2.79,527
22	0.86,614	72	2.83,464
23	0.90,551	73	2.87,401
24	0.94,488	74	2.91,338
25	0.98,425	75	2.95,275
26	1.02,362	76	2.99,212
27	1.06,299	77	3.03,149
28	1.10,236	78	3.07,086
29	1.14,173	79	3.11,023
30	1.18,110	80	3.14,960
31	1.22,047	81	3.18,897
32	1.25,984	82	3.22,834
33	1.29,921	83	3.26,771
34	1.33,858	84	3.30,708
35	1.37,795	85	3.34,645
36	1.41,732	86	3.38,582
37	1.45,669	87	3.42,519
38	1.49,606	88	3.46,456
39	1.53,543	89	3.50,393
40	1.57,480	90	3.54,330
41	1.61,417	91	3.58,267
42	1.65,354	92	3.62,204
43	1.69,291	93	3.66,141
44	1.73,228	94	3.70,078
45	1.77,165	95	3.74,015
46	1.81,102	96	3.77,952
47	1.85,039	97	3.81,889
48	1.88,976	98	3.85.826
49	1.92,913	99	3.89,763
50	1.96,850	100	3.93,700

Index to Tables and Data appears on Pages 27 to 30.

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POUNDS PER SQUARE INCH IN KILOGRAMMES PER SQUARE CENTIMETRE

Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre
1	.0703	41	2.8826	81	5.6949	205	14.4129
2	.1406	42	2.9529	82	5.7652	210	14.7645
3	.2109	43	3.0232	83	5.8355	215	15.1160
4	.2812	44	3.0935	84	5.9058	220	15.4675
5	.3515	45	3.1638	85	5.9761	225	15.8191
6	.4218	46	3.2341	86	6.0464	230	16.1706
7	.4921	47	3.3044	87	6.1167	235	16.5221
8	.5624	48	3.3747	88	6.1870	240	16.8737
9	.6328	49	3.4450	89	6.2573	245	17.2252
10	.7031	50	3.5153	90	6.3276	250	17.5767
11	.7734	51	3.5856	91	6.3979	255	17.9283
12	.8437	52	3.6559	92	6.4682	260	18.2798
13	.9140	53	3.7263	93	6.5385	265	18.6313
14	.9843	54	3.7966	94	6.6088	270	18.9829
15	1.0546	55	3.8669	95	6.6722	275	19.3344
16	1.1249	56	3.9372	96	6.7495	280	19.6860
17	1.1952	57	4.0075	97	6.8198	285	20.0375
18	1.2655	58	4.0778	98	6.8901	290	20.3890
19	1.3358	59	4.1481	99	6.9604	295	20.7406
20	1.4062	60	4.2184	100	7.0307	300	21.0921
21	1.4764	61	4.2887	105	7.3822	310	21.7951
22	1.5467	62	4.3590	110	7.7338	320	22.4981
23	1.6171	63	4.4293	115	8.0853	330	23.2012
24	1.6874	64	4.4996	120	8.4368	340	23.9043
25	1.7577	65	4.5699	125	8.7884	350	24.6073
26	1.8280	66	4.6402	130	9.1399	360	25.3104
27	1.8983	67	4.7106	135	9.4914	370	26.0135
28	1.9686	68	4.7809	140	9.8430	380	26.7166
29	2.0389	69	4.8512	145	10.1945	390	27.4196
30	2.1092	70	4.9215	150	10.5460	400	28.1227
31	2.1795	71	4.9918	155	10.8976	410	28.8258
32	2.2498	72	5.0621	160	11.2491	420	29.5288
33	2.3201	73	5.1324	165	11.6006	430	30.2319
34	2.3905	74	5.2027	170	11.9522	440	30.9350
35	2.4607	75	5.2730	175	12.3037	450	31.6380
36	2.5310	76	5.3433	180	12.6553	460	32.3411
37	2.6013	77	5.4136	185	13.0068	470	33.0442
38	2.6717	78	5.4939	190	13.3583	480	33.7437
39	2.7420	79	5.5542	195	13.7099	490	34.4503
40	2.8123	80	5.6246	200	14.0614	500	35.1533

Index to Tables and Data appears on Pages 27 to 30.

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A CONVENIENT METRIC CONVERSION (Compiled by C. W. HUNT.)

Millimeters × .03937 = inches.
Millimeters ÷ 25.4 = inches.
Centimeters × .3937 = inches.
Centimeters ÷ 2.54 = inches.
Meters = 39.37 inches. (Act of Congress.)
Meters × 3.281 = feet.
Meters × 1.094 = yards.
Meter per second = 196.86 feet per minute.
Kilometers × .621 = miles.
Kilometers × 3280.7 = feet.
Square Millimeters × .00155 = square inches.
Square Millimeters ÷ 645.1 = square inches.
Square Centimeters × .155 = square inches.
Square Centimeters ÷ 6.451 = square inches.
Square Meters × 10.764 = square feet.
Square Kilometers × 247.1=acres.
Hectares × 2.471 = acres.
Cubic Centimeters ÷ 16.383 = cubic inches.
Cubic Meters × 35.315 = cubic feet.
Cubic Meters × 1.308 = cubic yards.
Cubic Meters × 264.2 = gallons (231 cubic inches).
Liters × 61.022 = cubic inches. (Act of Congress.)
Liters × .2642 = gallons (231 cubic inches).
Liters ÷ 3.78 = gallons (231 cubic inches).
Liters ÷ 28.316 = cubic feet.
Grammes × 15.432 = grains. (Act of Congress.)
Grammes (water) ÷ 29.57 = fluid ounces.
Grammes ÷ 28.35 = ounces avoirdupois.
Grammes per cubic cent. ÷ 27.7 = pounds per cubic inch.
Joule × .7373 = foot pounds.
Kilograms × 2.2046 = pounds.
Kilograms × 35.3 = ounces avoirdupois.
Kilograms ÷ 1102.3 = tons (2,000 pounds).
Kilograms per square millimeters × 1422.3 = pounds per square inch
Kilograms per square cent. × 14 223 = pounds per square inch.
Kilo-watts × 1.34 = horse-power.
Watts ÷ 746 = horse-power.
Caloric × 3.968 = B. T. U.
Cheval vapeur × .9863 = horse-power.
(Centigrade × 1.8) + 32 = degrees Fahrenheit.
Francs × .193 = dollars.

FRENCH AND AMERICAN EQUIVALENT MEASURES

MEASURES OF LENGTH

French	*United States*
1 meter	39.37 inches, or 3.28083 feet
.3048 meter	1 foot
1 centimeter	.3937 inch
2.54 centimeters	1 inch.
1 millimeter	.03937 inch, or 1/25 inch nearly
25.4 millimeters	1 inch
1 kilometer	1093.61 yards, or .62137 mile

(*Continued on page* 618)

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MEASURES OF WEIGHT

1 gramme	15.432 grains
.0648 gramme	1 grain
28.35 grammes	1 ounce avoirdupois
1 kilogramme	2.2046 pounds
.4536 kilogramme	1 pound
1 tonne or metric ton	.9842 ton of 2,240 pounds 19.68 cwt.
1000 kilogrammes	2204.6 pounds

MEASURES OF CAPACITY

Liter (1 cubic decimeter)	61.023 cubic inches .03531 cubic foot .2642 gallon (American) 2.202 pounds water at 62° F.
8.317 liters	1 cubic foot
4.543 liters	1 gallon (British)
3.785 liters	1 gallon (American)

TABLE OF KILOGRAMME CALORIES, EQUIVALENT TO BRITISH THERMAL UNITS

Brit. Th'm'l	0	1	2	3	4	5	6	7	8	9	Brit. Th'm'l
0	.....	.252	.504	.756	1.008	1.260	1.512	1.764	2.016	2.268	0
10	2.52	2.772	3.024	3.276	3.528	3.780	4.032	4.284	4.536	4.788	10
20	5.04	5.292	5.544	5.796	6.048	6.300	6.552	6.804	7.056	7.308	20
30	7.56	7.812	8.064	8.316	8.568	8.820	9.072	9.324	9.576	9.828	30
40	10.08	10.332	10.584	10.836	11.088	11.340	11.592	11.844	12.096	12.348	40
50	12.60	12.852	13.104	13.356	13.608	13.860	14.112	14.364	14.616	14.868	50
50	15.12	15.372	15.624	15.876	16.128	16.380	16.632	16.884	17.136	17.388	60
70	17.64	17.892	18.144	18.396	18.648	18.900	19.152	19.404	19.656	19.908	70
80	20.16	20.412	20.664	20.916	21.168	21.420	21.672	21.924	22.176	22.428	80
90	22.68	22.932	23.184	23.436	23.688	23.940	24.192	24.444	24.696	24.948	90
Brit. Th'm'l	0	1	2	3	4	5	6	7	8	9	Brit. Th'm'l

1 British thermal unit = 251.996 therms, or gramme calories.

Index to Tables and Data appears on Pages 27 to 30.

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LIST OF NINE DIFFERENT STANDARD GAUGES USED IN THE UNITED STATES

DECIMAL EQUIVALENTS (Inches)

No. of Gauge	American or Brown & Sharpe Iron Wire	Birmingham or Stubbs Iron Wire	Washburn & Moen Iron Wire	Imperial Wire Gauge	U. S. Standard for Plate (Iron & Steel)	Stubbs Steel Wire	Twist Drill and Steel Wire	Washburn & Moen Music Wire	Wood and Machine Screws	No. of Gauge	Fractional Parts of an Inch	Decimal Equiv. of Sixty-fourths, etc.
8-0	.....	.....	.....	.....	.....	.....	This gauge	.0083	....	8-0	1/64	.01563
7-0	.....	.....	.....	.....	.500	.....	from one to	.0087	....	7-0	1/32	.03125
6-0	.....	.....	.....	.464	.469	.....	three thous-	.0095	....	6-0	1/16	.625
5-0	.....	.....	.....	.432	.438	.....	andths larger	.010	....	5-0	5/64	.07813
4-0	.460	.454	.394	.400	.406	.....	than same Nos.	.011	....	4-0	3/32	.09375
3-0	.410	.425	.363	.372	.375	.....	of Stubbs steel	.012	.032	3-0	7/64	.10938
2-0	.365	.380	.331	.348	.344	.....	wire gauge	.013	.045	2-0	1/8	.125
0	.325	.340	.307	.334	.313	.....		.014	.058	0	9/64	.14063
1	.289	.300	.283	.300	.281	.277	.228	.016	.071	1	5/32	.15625
2	.258	.284	.263	.276	.266	.219	.221	.017	.084	2	11/64	.17188
3	.229	.259	.244	.252	.250	.212	.213	.018	.097	3	3/16	.1875
4	.204	.238	.225	.232	.234	.207	.209	.019	.110	4	13/64	.20313
5	.182	.220	.207	.212	.219	.204	.206	.020	.124	5	7/32	.21875
6	.162	.203	.192	.192	.203	.201	.204	.022	.137	6	15/64	.23438
7	.144	.180	.177	.176	.188	.199	.201	.023	.150	7	1/4	.25
8	.128	.165	.162	.160	.172	.197	.199	.024	.163	8	17/64	.26563
9	.114	.148	.148	.144	.156	.194	.196	.026	.176	9	9/32	.28125
10	.102	.134	.135	.128	.141	.191	.194	.027	.189	10	19/64	.29688
11	.091	.120	.121	.116	.125	.188	.191	.028	.203	11	5/16	.3125
12	.081	.109	.106	.104	.109	.185	.189	.030	.216	12	21/64	.32813
13	.072	.095	.092	.092	.094	.182	.185	.031	.229	13	11/32	.34375
14	.064	.083	.080	.080	.078	.180	.182	.033	.242	14	23/64	.35938
15	.057	.072	.072	.072	.070	.178	.180	.035	.255	15	3/8	.375
16	.051	.065	.063	.064	.063	.175	.177	.036	.268	16	25/64	.39063
17	.045	.058	.054	.056	.056	.172	.173	.038	.282	17	13/32	.40625
18	.040	.049	.048	.048	.050	.168	.170	.040	.295	18	27/64	.42188
19	.036	.042	.041	.040	.044	.164	.166	.041	.308	19	7/16	.4375
20	.032	.035	.035	.036	.038	.161	.161	.043	.321	20	29/64	.45313
21	.028	.032	.032	.032	.034	.157	.159	.046	.334	21	15/32	.46875
22	.025	.028	.029	.028	.031	.155	.157	.048	.347	22	31/64	.48438
23	.023	.025	.026	.024	.028	.153	.154	.051	.360	23	1/2	.5
24	.020	.022	.023	.022	.025	.151	.152	.055	.374	24	33/64	.51563
25	.018	.020	.020	.020	.022	.148	.150	.059	.387	25	17/32	.53125
26	.016	.018	.018	.018	.019	.146	.147	.063	.400	26	35/64	.54688
27	.0141	.016	.0173	.0164	.0171	.143	.144	.066	.413	27	9/16	.5625
28	.0126	.014	.0162	.0149	.0156	.139	.141	.072	.426	28	37/64	.57813
29	.0112	.013	.015	.0136	.014	.134	.136	.076	.439	29	19/32	.59375
30	.010	.012	.014	.0124	.0125	.127	.129	.080	.453	30	39/64	.60938
31	.0089	.010	.0132	.0116	.0109	.120	.120	....	.466	31	5/8	.625
32	.0079	.009	.0128	.0108	.0101	.115	.116	....	.479	32	41/64	.64063
33	.007	.008	.0118	.010	.0093	.112	.113	....	.492	33	21/32	.65625
34	.0063	.007	.0104	.0092	.0085	.110	.111	....	.505	34	43/64	.67188
35	.0056	.005	.0095	.0084	.0078	.108	.110	....	.518	35	11/16	.6875
36	.005	.004	.009	.0076	.007	.106	.1065	....	.532	36	45/64	.70313
37	.0044	.....	.....	.0068	.0066	.103	.104	....	.545	37	23/32	.71875
38	.0039	.....	.....	.006	.0062	.101	.1015	....	.558	38	47/64	.73438
39	.0035	.....	.....	.0052	.....	.099	.0995	....	.571	39	3/4	.75
40	.0031	.....	.....	.0048	.....	.097	.098	....	.584	40	49/64	.76563
41	.....	.....	.....	.....	.....	.095	.096	....	.597	41	25/32	.78125
42	.....	.....	.....	.....	.....	.092	.094	....	.611	42	51/64	.79688
43	.....	.....	.....	.....	.....	.088	.089	....	.624	43	13/16	.8125
44	.....	.....	.....	.....	.....	.085	.086	....	.637	44	53/64	.82813
45	.....	.....	.....	.....	.....	.081	.082	....	.650	45	27/32	.84375
46	.....	.....	.....	.....	.....	.079	.081	....	.663	46	55/64	.85938
47	.....	.....	.....	.....	.....	.077	.079	....	.676	47	7/8	.875
48	.....	.....	.....	.....	.....	.075	.076	....	.690	48	57/64	.89063
49	.....	.....	.....	.....	.....	.072	.073	....	.703	49	29/32	.90625
50	.....	.....	.....	.....	.....	.069	.070	....	.716	50	59/64	.92188

Letter Sizes Stubbs Steel Wire

A	.234	I	.272	R	.339
B	.238	J	.277	S	.348
C	.242	K	.281	T	.358
D	.246	L	.290	U	.368
E	.250	M	.295	V	.377
F	.257	N	.302	W	.386
G	.261	O	.316	X	.397
H	.266	P	.323	Y	.404
		Q	.332	Z	.413

Index to Tables and Data appears on Pages 27 to 30.

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SIZES OF NUMBERS OF THE UNITED STATES STANDARD GAUGE FOR SHEET AND PLATE IRON AND STEEL

An Act Establishing a Standard Gauge for Sheet and Plate Iron and Steel

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: That for the purpose of securing uniformity the following is established as the only gauge for sheet and plate iron and steel in the United States of America namely:

Number of Gauge	Approximate Thickness in Fractions of an Inch	Approximate Thickness in Decimal Parts of an Inch	Weight per Square Foot in Ounces Avoirdupois	Weight per Square Foot in Pounds Avoirdupois
0000000	1/2	.5	320	20.00
000000	15/32	.46875	300	18.75
00000	7/16	.4375	280	17.50
0000	13/32	.40625	260	16.25
000	3/8	.375	240	15.00
00	11/32	.34375	220	13.75
0	5/16	.3125	200	12.50
1	9/32	.28125	180	11.25
2	17/64	.265625	170	10.625
3	1/4	.25	160	10.00
4	15/64	.234375	150	9.375
5	7/32	.21875	140	8.75
6	13/64	.203125	130	8.125
7	3/16	.1875	120	7.5
8	11/64	.171875	110	6.875
9	5/32	.15625	100	6.25
10	9/64	.140625	90	5.625
11	1/8	.125	80	5.00
12	7/64	.109375	70	4.375
13	3/32	.09375	60	3.75
14	5/64	.078125	50	3.125
15	9/128	.0703125	45	2.8125
16	1/16	.0625	40	2.5
17	9/160	.05625	36	2.25
18	1/20	.05	32	2.
19	7/160	.04375	28	1.75
20	3/80	.0375	24	1.50
21	11/320	.034375	22	1.375
22	1/32	.03125	20	1.25
23	9/320	.028125	18	1.25
24	1/40	.025	16	1.
25	7/320	.021875	14	.875
26	3/160	.01875	12	.75
27	11/640	.0171875	11	.6875
28	1/64	.015625	10	.625
29	9/640	.0140625	9	.5625
30	1/80	.0125	8	.5
31	7/640	.0109375	7	.4375
32	13/1280	.01015625	6 1/2	.40625
33	3/320	.009375	6	.375
34	11/1280	.00859375	5 1/2	.34375
35	5/640	.0078125	5	.3125
36	9/1280	.00703125	4 1/2	.28125
37	17/2560	.006640625	4 1/4	.265625
38	1/160	.00625	4	.25

And on and after July first, eighteen hundred and ninety-three, the same and no other shall be used in determining duties and taxes levied by the United States of America on sheet and plate iron and steel. But this act shall not be construed to increase duties upon any articles which may be imported.

Sec. 3.—That in the practical use and application of the standard gauge hereby established a variation of two and one-half per cent. either way may be allowed.

Approved March 3, 1893.

Index to Tables and Data appears on Pages 27 to 30.

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WEIGHTS OF METALS

	Lbs. per Cu. Ft.	Lbs. per Cu. In.
Aluminum, cast	160	.0926
Brass, cast	506.3	.293
Brass, sheet	528	.3056
Babbitt metal	440.6	.255
Bronze, aluminum	471.2	.2727
Bronze, phosphor	575.8	.3332
Copper wire	555.1	.3212
Cast iron	450.	.2604
Wrought iron, bars	486.8	.2817
Steel, Bessemer	490.7	.284
Lead, cast	709.5	.4106
Nickel	548.7	.3175
Tin	458.3	.2652
Zinc	436.5	.2526

PROPORTIONATE WEIGHT OF CASTINGS TO WEIGHT OF WOOD PATTERNS

A Pattern Weighing One Pound, Made of (Less Weight of Core Prints)	Cast Iron	Brass	Copper	Bronze	Bell Metal	Zinc
Pine or Fir	16	15.8	16.7	16.3	17.1	13.5
Oak	9	10.1	10.4	10.3	10.9	8.6
Beech	9.7	10.9	11.4	11.3	11.9	9.1
Linden	13.4	15.1	16.7	15.5	16.3	12.9
Pear	10.2	11.5	11.9	11.8	12.4	9.8
Birch	10.6	11.9	12.3	12.2	12.9	10.2
Alder	12.8	14.3	14.9	14.7	15.5	12.2
Mahogany	11.7	13.2	13.7	13.5	14.2	11.2
Brass	0.85	0.95	0.99	0.98	1.0	0.81

Index to Tables and Data appears on Pages 27 to 30.

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WEIGHT OF STEEL PER LINEAL FOOT

FLAT SIZES

	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1¾	2	2¼	2½	2¾	3	3½	4	5	6	7
⅛	.213	.266	.320	.372	.426	.479	.530	.585	.640	.745	.850	.955	1.07	1.18	1.28	1.49	1.70	2.13	2.56	2.98
3/16	.319	.399	.480	.558	.639	.718	.790	.878	.960	1.12	1.28	1.43	1.60	1.76	1.92	2.24	2.55	3.20	3.83	4.47
¼	.425	.533	.640	.743	.852	.958	1.06	1.17	1.28	1.49	1.70	1.91	2.13	2.34	2.56	2.98	3.40	4.26	5.11	5.96
5/16	.531	.665	.800	.929	1.06	1.20	1.33	1.46	1.60	1.86	2.13	2.39	2.66	2.92	3.19	3.72	4.25	5.32	6.38	7.44
⅜	.638	.798	.960	1.12	1.28	1.43	1.59	1.75	1.91	2.23	2.55	2.87	3.20	3.51	3.83	4.46	5.10	6.40	7.66	8.92
7/16	.744	.931	1.12	1.30	1.49	1.67	1.86	2.05	2.23	2.60	2.98	3.35	3.72	4.09	4.46	5.21	5.95	7.44	8.92	10.40
½	.....	1.07	1.28	1.49	1.70	1.91	2.13	2.34	2.55	2.98	3.40	3.83	4.26	4.68	5.10	5.96	6.80	8.52	10.20	11.90
9/16	.....	1.20	1.44	1.67	1.91	2.15	2.39	2.63	2.87	3.35	3.83	4.30	4.78	5.26	5.74	6.69	7.65	9.56	11.50	13.40
⅝	.....	.....	1.60	1.86	2.12	2.39	2.66	2.92	3.19	3.72	4.26	4.79	5.32	5.86	6.39	7.44	8.52	10.64	12.78	14.90
11/16	.....	.....	1.76	2.04	2.34	2.63	2.92	3.22	3.51	4.09	4.68	5.26	5.84	6.43	7.01	8.18	9.35	11.70	14.00	16.40
¾	.....	.....	.....	2.23	2.55	2.86	3.19	3.50	3.83	4.46	5.10	5.74	6.40	7.02	7.65	8.92	10.20	12.80	15.30	17.90
13/16	.....	.....	.....	2.41	2.76	3.11	3.45	3.80	4.14	4.83	5.53	6.22	6.91	7.60	8.29	9.67	11.10	13.80	16.60	19.30
⅞	.....	.....	.....	.....	2.98	3.34	3.72	4.09	4.46	5.21	5.96	6.70	7.46	8.19	8.94	10.42	11.92	14.87	17.88	20.80
15/16	.....	.....	.....	.....	3.19	3.59	3.98	4.38	4.78	5.58	6.38	7.17	7.97	8.77	9.56	11.20	12.80	15.90	19.10	22.40
1	.....	.....	.....	.....	.....	3.82	4.25	4.68	5.10	5.96	6.80	7.66	8.52	9.36	10.20	11.92	13.60	17.04	20.40	23.80
1⅛	.....	.....	.....	.....	.....	.....	4.78	5.27	5.74	6.71	7.65	8.61	9.59	10.54	11.48	13.41	15.30	19.17	22.95	26.80
1¼	.....	.....	.....	.....	.....	.....	.....	5.85	6.38	7.45	8.50	9.57	10.65	11.71	12.76	14.90	17.00	21.30	25.61	29.76
1½	.....	.....	.....	.....	.....	.....	.....	7.02	7.67	8.94	10.20	11.49	12.78	14.04	15.30	17.88	20.40	25.56	30.60	35.70

Index to Tables and Data appears on Pages 27 to 30.

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WEIGHT IN POUNDS OF SHEET AND BAR ALUMINUM, BRASS AND STEEL

Thickness or Diam. in Inch		Sheets per Square Foot			Square Bars, One Foot Long			Round Bars, One Foot Long		
Fraction	Dec.	Alum.	Brass	Steel	Alum.	Brass	Steel	Alum.	Brass	Steel
1/16	.0625	.869	2.77	2.52	.004	.014	.013	.003	.011	.010
1/8	.125	1.739	5.55	5.10	.018	.057	.053	.014	.047	.042
3/16	.1875	2.609	8.32	7.65	.041	.131	.119	.032	.102	.094
1/4	.2500	3.479	11.10	10.20	.072	.230	.212	.057	.182	.167
5/16	.3125	4.348	13.87	12.75	.114	.380	.333	.089	.284	.261
3/8	.3750	5.218	16.64	15.30	.163	.520	.478	.128	.408	.375
7/16	.4375	6.088	19.42	17.85	.222	.708	.651	.174	.555	.511
1/2	.5000	6.958	22.20	20.40	.290	.925	.850	.227	.724	.667
9/16	.5625	7.827	24.97	22.95	.367	1.171	1.076	.288	.919	.845
5/8	.6250	8.697	27.74	25.50	.453	1.445	1.328	.356	1.136	1.043
11/16	.6875	9.567	30.52	28.05	.548	1.748	1.608	.430	1.372	1.262
3/4	.7500	10.436	33.29	30.60	.652	2.080	1.913	.516	1.646	1.502
13/16	.8125	11.306	36.07	33.15	.766	2.445	2.245	.601	1.917	1.763
7/8	.8750	12.175	38.84	35.70	.888	2.833	2.603	.697	2.223	2.044
15/16	.9375	13.045	41.61	38.25	1.019	3.251	2.989	.800	2.552	2.347
1	1.0000	13.915	44.39	40.80	1.159	3.697	3.400	.911	2.906	2.670
1 1/16	1.0625	14.784	47.16	43.35	1.309	4.176	3.838	1.028	3.279	3.014
1 1/8	1.125	15.654	49.94	45.90	1.467	4.630	4.303	1.152	3.675	3.379
1 3/16	1.1875	16.524	52.71	48.45	1.635	5.216	4.795	1.284	4.096	3.766
1 1/4	1.2500	17.394	55.48	51.00	1.812	5.780	5.312	1.423	4.539	4.173
1 5/16	1.3125	18.263	58.26	53.55	1.997	6.370	5.857	1.569	5.003	4.600
1 3/8	1.3750	19.133	61.04	56.10	2.192	6.692	6.428	1.722	5.491	5.049
1 7/16	1.4375	20.002	63.81	58.65	2.396	7.644	7.026	1.882	6.002	5.518
1 1/2	1.5000	20.872	66.58	61.20	2.609	8.322	7.650	2.049	6.536	6.008
1 9/16	1.5625	21.741	69.35	63.75	2.831	9.030	8.301	2.223	7.091	6.520
1 5/8	1.6250	22.611	72.13	66.30	3.062	9.768	8.978	2.405	7.672	7.051
1 11/16	1.6875	23.481	74.90	68.85	3.302	10.53	9.682	2.593	8.271	7.604
1 3/4	1.7500	24.350	77.67	71.40	3.550	11.32	10.41	2.789	8.896	8.178
1 13/16	1.8125	25.250	80.54	73.95	3.810	12.15	11.17	2.992	9.544	8.773
1 7/8	1.8750	26.090	83.22	76.50	4.075	13.00	11.95	3.202	10.21	9.388
1 15/16	1.9375	26.960	86.00	79.05	4.352	13.88	12.76	3.417	10.90	10.02
2	2.0000	27.829	88.77	81.60	4.638	14.79	13.60	3.642	11.62	10.68

WEIGHT OF ALUMINUM, IRON, COPPER, BRASS AND LEAD BALLS

Dia. In.	Alum., Lbs.	Iron, Lbs.	Copper, Lbs.	Brass, Lbs.	Lead, Lbs.	Dia., In.	Alum. Lbs.	Iron, Lbs.	Copper Lbs.	Brass, Lbs.	Lead, Lbs.
1	.045	.136	.166	.158	.214	7	15.58	46.76	57.1	54.5	73.7
1½	.153	.46	.562	.537	.727	7½	19.17	57.52	70.0	67.11	90.0
2	.363	1.09	1.3	1.25	1.7	8	23.27	69.81	85.2	81.4	110.1
2½	.710	2.13	2.60	2.50	3.35	8½	27.91	83.73	102.3	100.0	132.3
3	1.22	3.68	4.5	4.3	5.8	9	33.10	99.4	121.3	115.9	156.7
3½	1.94	5.84	7.14	6.82	9.23	9½	38.90	116.9	143.0	136.4	184.7
4	2.90	8.72	10.7	10.2	13.8	10	45.45	136.35	166.4	159.0	215.0
4½	3.13	12.42	15.25	14.5	19.6	10½	52.60	157.84	193.0	184.0	250.0
5	5.68	17.04	20.8	19.9	26.9	11	60.49	181.48	221.8	211.8	286.7
5½	7.56	22.68	27.74	26.47	36.0	11½	69.12	207.37	253.5	242.0	327.7
6	9.81	29.45	35.9	34.3	46.4	12	78.54	235.62	288.1	275.0	372.[illegible]
6½	12.48	37.44	45.76	43.67	59.13						

Index to Tables and Data appears on Pages 27 to 30.

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SPECIFICATIONS FOR CYLINDER CASTINGS (ALCO)

DOMESTIC IRON CASTINGS

		Per Cent.
Silicon		1.25 to 1.60
Sulphur	less than	0.11
Phosphorus		0.50 to 0.80
Manganese		0.50 to 0.80
Combined carbon	over	0.40
Graphitic carbon	under	3.00

IMPORTED CYLINDER CASTINGS

		Per Cent.
Silicon		2.50 to 3.00
Sulphur	under	0.10
Phosphorus		1.50 to 1.80
Manganese		0.30 to 0.50
Combined carbon	over	0.50
Graphitic carbon	under	3.00

RESULTS OF TESTS OF PARSONS' MANGANESE BRONZE (CONDUCTED BY R. W. HUNT & CO.)

TENSION TESTS

Kind of Metal	Rolled		Cast	
Length, test section	2.00	2.00	2.00	2.00
Original diameter	.499	.50	.505	.505
Original area	.1956	.1963	.200	.200
Reduced diameter	.387	.372	.390	.395
Reduced area	.1176	.1087	.1194	.1225
Elongation in 2 in	.58	.70	.72	69
Elastic limit, lbs	9,740	9,900	9,230	8,950
Maximum load, lbs	13,970	13,970	17,600	16,950
Elastic limit, lbs. per sq. in	49,790	50,430	46,150	43,250
Maximum load	71,420	71,160	78,000	74,750
Reduction of area, per cent	39.8	44.6	40.3	38.7
Elongation, per cent	29	35	36	34.5
Fracture	½ Cup silky and granular	½ Cup silky and granular	½ Cup silky and granular	½ Cup silky and granular

COMPRESSION TESTS

Kind of Metal	Rolled	
Length of test piece	2.00	2.00
Diameter of test piece	1.03	1.02
Area of test piece	.790	.7886
Total compression	.584	.629
Approximate elastic limit	52,500	52,500
Maximum load, lbs	113,500	116,300
Approximate elastic limit, lbs. per sq. in	66,460	66,570
Maximum load, lbs. per sq. in	143,770	147,500
Failed by	Shear angle with vertical 36 deg.	Shear angle with vertical 33 deg.
Fracture	Silky	Silky

Index to Tables and Data appears on Pages 27 to 30.

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PROPERTIES OF CAST ALUMINUM

The tensile strength of aluminum varies with the thickness of the castings, about as follows:

Thickness in Inches	Relative Tensile Strength in Pounds per Square Inch
0.10	108
0.20	100
0.30	98
0.40	94
0.50	90

The specific gravity of aluminum increases as the walls of castings are made thinner approximately as follows:

Thickness in Inches	Specific Gravity Corresponding
1 (square)	2.964
3–4	3.004
5–8	3.002
9–16	3.004
1–2	3.012
3–8	3.024
1–4	3.007
1–8	3.007

Shrinkage in aluminum castings is about 17.64th inch per foot. The effect of heat on tensile strength and expansion of pure aluminum is shown in the following table:

Temperature, Fahrenheit	Tensile Strength, Tons per Square Inch	Expansion in Volume
58°	11.7	.000884
212°	9.5	.006120
302°	8.1	.009180
392°	6.3	.012240
482°	4.8	.015300
572°	3 6	.018360
752°	2.4	.024480
842°	1.5	.027540
860°	1.0	.028152

MATERIALS FOR MOTOR POPPET VALVES

The materials of construction most commonly used include the following: Special high carbon steel, high nickel alloy steel, nickel steel heads on carbon steel stems, cast gray iron heads on carbon steel stems.

HIGH CARBON STEEL FOR VALVES

Chemical Composition

Carbon	Silicon	Sulphur	Phosphorus	Manganese
115	10	0.015	0.012	0.40

PHYSICAL PROPERTIES

Tensile Strength in Pounds per Square Inch	Elastic Limit in Pounds per Square Inch	Elongation per cent. in 2 Inches	Reduction of Area in per cent.
149,800	50,000	5	16

HIGH NICKEL ALLOY STEEL FOR VALVES

Chemical Composition

Nickel	Carbon	Silicon	Sulphur	Phosphorus	Manganese
35	0.10	0.15	0.012	0.012	0.35

PHYSICAL PROPERTIES

Tensile Strength in Pounds per Square Inch	Elastic Limit in Pounds per Square Inch	Elongation per cent. in 2 Inches	Reduction of Area in per cent.
85,000	55,000	25	50

When the alloy steel is used for the heads and the soft steel for the stems union can be effected by the autogenous or electric welding processes.

Index to Tables and Data appears on Pages 27 to 30.

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STRENGTH OF AUTOMOBILE MATERIALS

	Modulus of Rigidity	Elastic Limit	Tensile Strength
Aluminum alloys	8 to 11 million	10 M to 15 M	20 M to 30 M
Phosphor bronze	12 to 14 "	20,000	30,000
Manganese bronze	15 "	35,000	50,000
Aluminum bronze	15 "	50,000	75,000
Wrought iron	28 "	30,000	40,000
Mild open hearth steel	28 "	40,000	60,000
Tool steel	29 "	80,000	110,000
Nickel steel	28 "	80,000	110,000
Nickel chrome steel	30 "	160,000	180,000
Vanadium steel treated	30 "	220,000	228,000

All of the above materials stand well under dynamic stress with the exception of the tool steel, which should not be used for this purpose.

TEST OF HIGH QUALITY NICKEL CHROME STEEL (KRUPP)

DIMENSIONS OF TEST BARS, 5.91 INS. LONG AND 0.59 INS. DIAMETER

	Normal	Slightly Hardened	Greater Degree of Hardness
Elastic limit, pounds per square inch	86,909	148,072	193,589
Tensile strength, pounds per square inch	111,943	155,326	221,325
Elongation, per cent	14.5	9.1	7.7
Contraction, per cent	64.0	55.6	46.2

Foregoing tests assume correct heat treatment.

MELTING POINTS OF METALS

Cast iron	2210 deg. Fahr
Wrought iron	2912 " "
Steel	2500 " "
Copper	2160 " "
Brass	1900 " "
Aluminum (pure)	1112 " "
Lead	608 " "
Tin	446 " "

Index to Tables and Data appears on Pages 27 to 30.

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MALLEABLE IRON TESTS

Results of Test of Sample Malleable Iron Bar made for the Ohio Malleable Iron Company, Columbus, O.

Test No.	Test made by	Elastic Limit Lbs. per sq. in.	Tensile Strength Lbs. per sq. in.	Elongation per cent.	Reduction of Area per cent.
58491	The Detroit Testing Laboratory.	37195	53283	15.62	21.38
32504	Pittsburg Testing Laboratory	34750	54340	18.00	21.1
	Robert W. Hunt & Co.....	41195	52940	17.00	25.63

SPECIFICATIONS FOR CAST IRON PARTS (GERMAN).

(*Translated from "Metall Technick"*)

Specifications for cast-iron parts have only of relatively recent date been subjected to regulations of recognized value, and this has been one of the reasons for discrediting castings as parts in automobile construction, their strength being difficult to determine in advance. The reason why practice and science have refrained from formulating basic rules for deciding the strength and properties of cast-iron parts, even though foundry science has progressed by leaps and bounds, is to be sought in the fact that the unit strength of a casting, even in the case of comparison between materials derived from the same ladle, depends largely upon the dimensions of the piece and the more or less rapid cooling to which it has been subjected. The same difference arises with regard to a single cast piece, according to the direction and location of the stress. The strength along one cross-section varies from the strength through another section, and the difference is not pro rata with the dimensions. Slow cooling, as where the diameter is greatest, produces a coarser structure and also causes carbon to be precipitated as graphite between the walls of adjacent crystals, greatly reducing strength. Flexion tests made by O. Leyde with bars of square section of different dimensions and all cast in one piece with a heavier bar uniting them across one end showed that the softest iron developed the most pronounced differences in unit strength, in favor of the bars of small section. A bar 10 by 10 millimeters in section endured a stress of 47 kilograms per square millimeter, while a bar of 150 by 150 millimeters cross-section endured only 18 kilograms per square millimeter. In three series of tests the materials differed mainly in silicon, this metalloid running from 2.1 per cent. in the hardest to 1.5 per cent. and 1.2 per cent. in the softer grades. The composition otherwise was carbon 3, phosphorus 0.6, manganese 0.7 and sulphur 0.12. Similar results were reached in tests by Sulzer Brothers of Winterthur with bars from 5 to 50 millimeters in diameter, giving a strength decreasing from 63 kilograms for a bar of 5 millimeters diameter to 27 kilograms for the largest size. The Society of German Iron Foundries has now created regulations for cast-iron tests in which the principal source of error in previous rules—the use of only a single dimension of bar—is eliminated. The new regulations distinguish between: A, machine castings of (1) medium, (2) high and (3) very high strength; B, architectural and construction castings and C, pipe castings, comprising (1) gas and water pipe and (2) steam pipe. Each subdivision is further divided according to dimensions of the casting in three classes: (1) Pieces with walls up to 15 millimeters thick; (2) between 15 and 25 millimeters, and (3) average wall thickness of more than 25 millimeters. Further regulations extend to shapes, properties of the material and method of producing test bars. In addition to flexion tests here is provided test by internal hydraulic pressure for tubular castings. The testing work which was called into action by these regulations at the various foundries has created a demand for a special machine for facilitating the measurements, and one such has been produced by the Düsseldorfer Machine Company, Inc., and is provided with automatic stress-measuring instrument and recording manometer giving direct reading in kilograms.

Index to Tables and Data appears on Pages 27 to 30.

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EFFICIENCY TEST OF AUTOMOBILE RADIATOR (McCORD)

Height, 28.5″; Width, 25″; Thickness, 3.25″; Weight, 60 pounds. Made up of 144 Vertical Water Tubes ¼″ Diameter

Time in Mins.	R.P.M. of Motor	Pounds on Scale	Temperature F.				
			Water		Air		
			To Radiator	From Radiator	To Fan	From Fan	In Room
00	1000	20.00	160.00	152.00	90.25	95	86.0
05	1000	20.00	181.00	172.00	91.75	99	87.8
10	1000	19.75	189.00	180.00	91.75	100	88.5
15	1000	20.00	193.00	184.00	91.75	102	89.0
20	1000	19.75	195.00	185.00	91.75	109	89.6
25	1000	20.00	197.00	187.00	92.50	104	90.3
30	1000	20.00	198.00	188.00	92.50	104	90.3
35	1000	20.00	197.00	187.00	92.50	103	89.9
40	1000	20.00	197.00	187.00	95.50	103	90.1
45	1000	20.00	197.25	187.25	92.50	102	90.1
50	1000	20.00	197.00	187.25	92.50	102	89.6
55	1000	20.00	197.00	187.25	93.25	104	89.6
60	1000	20.00	197.00	187.00	91.75	102	90.5
65	1000	30.00	207.00	196.00	94.00	105	91.0
70	1000	30.00	211.00	201.50	96.25	107	92.5
71	1000	30.00	212.00	202.00	96.25	107	92.8

Note.—144 pounds of jacket water per minute.

The test as here given was made by an automobile builder. The table shows, among other points of interest, that it took 25 minutes before the water reached a constant temperature, after which the radiator abstracted 1,431.4 B.T.U. of heat from the jacket water, with a difference in the water between inlet and outlet of 9.94 degrees Fahrenheit, working between the limits of 197 and 187 degrees Fahrenheit. The amount of water circulated was (as given in the table) 144 pounds. Since the temperature did not reach the maximum allowable in practice (the boiling point of water) it is a fair inference that the capacity of this radiator can be taken as about equal to 1,500 B.T.U. (British thermal units of heat) under the conditions of this test, considering round numbers.

APPROXIMATE WOOD WHEEL DIAMETERS FOR VARIOUS SIZES AND TYPES OF RIMS

Size Tire	Clincher Universal and Stanweld Detachable	Firestone Demountable	Fisk Bolted On	Fisk Demountable	Stanweld Demountable	Stanweld Demountable Metric Sizes
30 × 3½	22 11/16	21 11/16	21 13/16	19 3/16	22	.....
32 × 3½	24 11/16	23 11/16	23 13/16	21 3/16	24	810 × 90 − 23 3/16
34 × 3½	26 11/16	25 11/16	25 13/16	23 3/16	26	870 × 90 − 25 5/8
36 × 3½	28 11/16	27 11/16	27 13/16	.....	28	910 × 90 − 27 3/16
30 × 4	21 11/16	20 11/16	20 5/8	.....	21	.....
32 × 4	23 11/16	22 11/16	22 5/8	20	23	.....
34 × 4	25 11/16	24 11/16	24 5/8	22	25	875 × 105 − 25 5/8
36 × 4	27 11/16	26 11/16	26 5/8	24	27	915 × 105 − 27 3/16
32 × 4½	22 21/32	21 21/32	21½	.....	.....	820 × 120 − 21 17/64
34 × 4½	24 21/32	23 21/32	23½	20 13/16	23 59/64	880 × 120 − 23 47/64
36 × 4½	26 21/32	25 21/32	25½	22 13/16	25 59/64	920 × 120 − 25 3/16
34 × 5	23 21/32	22 21/32	.....	19 7/16	22 59/64	.....
36 × 5	25 21/32	24 21/32	.....	21 13/16	24 59/64	.....
36 × 5½	24 21/32	23 21/32	.....	.....	.....	935 × 135 − 24 3/64
37 × 5½	25 21/32	24 21/32	.....	.....	24 3/64	.....

Index to Tables and Data appears on Pages 27 to 30.

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AUTOMOBILE WHEEL DATA

The following information is approximately correct, but the weights, etc., may vary according to the height of wheels, etc.:

WEIGHT OF WHEELS PER SET OF FOUR

Weight of wheels and hubs without rims or channels, size of spoke 7/8 to 1" or 1 1/8", about	50	pounds
" same size with steel rims for 2 1/2" or 3" tire	110	"
" 1" or 1 1/8" spokes	65	"
" including rims for 3" or 3 1/2" tires	145	"
" 1 1/4" or 1 3/8" spokes	100	"
" including rims for 3 1/2" or 4" tires	210	"
" 1 3/8" or 1 1/2" spokes	112	"
" including rims for 4" or 4 1/2" tire	250	"

Axles are not included in above.

METRIC TIRES AND THEIR AMERICAN EQUIVALENTS

Metric Sizes	Approximate Size in Inches
650 x 65	26 x 2 1/2
700 x 65	28 x 2 1/2
750 x 65	30 x 2 1/2
800 x 65	32 x 2 1/2
830 x 65	33 x 2 1/2
860 x 65	34 x 2 1/2
700 x 85	28 x 3 1/4
750 x 85	30 x 3 1/4
800 x 85	32 x 3 1/4
860 x 85	34 x 3 1/4
760 x 90	30 x 3 1/2
810 x 90	32 x 3 1/2
840 x 90	32 x 3 1/2
870 x 90	34 x 3 1/2
910 x 90	36 x 3 1/2
960 x 90	38 x 3 1/2
1010 x 90	40 x 3 1/2
815 x 105	32 x 4
875 x 105	34 x 4
915 x 105	36 x 4
820 x 120	32 x 4 1/2–5
850 x 120	33 x 4 1/2–5
880 x 120	34 x 4 1/2–5
920 x 120	36 x 4 1/2–5
1020 x 120	40 x 4 1/2–5
1080 x 120	42 x 4 1/2–5

Index to Tables and Data appears on Pages 27 to 30.

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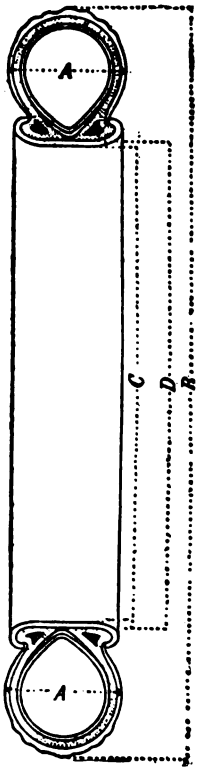
CLINCHER TIRE AND RIM DIMENSIONS



A	B	C	D
Inches	Inches	Inches	Inches
2 ½	26	20 ¾	21
3	26	19 ¾	20
2 ½ and 3	28	21 ¾	22
2 ½ and 3	30	23 ¾	24
3	32	25 ¾	26
3	34	27 ¾	28
3	36	29 ¾	30
3 ½	28	20 11/16	21
3 ½	30	22 11/16	23
3 ½	32	24 11/16	25
3 ½	34	26 11/16	27
3 ½	36	28 11/16	29
4	30	21 11/16	22
4	32	23 11/16	24
4	34	25 11/16	26
4	36	27 11/16	28
4 ½	32	22 11/16	23
4 ½	34	24 11/16	25
4 ½	36	26 11/16	27

PROPORTIONS BETWEEN AXLE LOADS AND TIRE SIZES ADOPTED BY AMERICAN TIRE MAKERS

2 ½-inch tires, all diameters	225	pounds per wheel
3 inch tires, all diameters	350	" " "
3 ½ x 28-inch tires	400	" " "
3 ½ x 30-inch tires	450	" " "
3 ½ x 32-inch tires	555	" " "
3 ½ x 34-inch tires	600	" " "
3 ½ x 36-inch tires	600	" " "
4 x 30-inch tires	550	" " "
4 x 32-inch tires	550	" " "
4 x 34-inch tires	700	" " "
4 x 36-inch tires	750	" " "
4 ½ x 32-inch tires	700	" " "
4 ½ x 34-inch tires	800	" " "
4 ½ x 36-inch tires	900	" " "

For weights in excess of 1,000 pounds per wheel, 5-inch tires and over are recommended. Weights given apply to car without passengers.

Index to Tables and Data appears on Pages 27 to 30.

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AIR PRESSURES FOR INFLATING PNEUMATIC TIRES RECOMMENDED BY LEADING MAKERS

Diameter of Tire, Inches	Maximum Weight on Wheel, lbs.	Air Pressure in Tire, lbs. per Square Inch
2½	225	50
3	350	60
3½	600	70
4	750	80
4½	1,000	90
5	1,000	90

INCREASE IN AIR PRESSURES CAUSED BY DRIVING

The figures given by tire manufacturers as the most suitable for initial inflation generally take into account the increase in temperature and pressure created by prolonged running. It, however, is useful to know what this increase is. The figures given in the following table are given by a French authority and are averages computed on tires from 3 to 4½ inches diameter under usual touring car weight and speed conditions. For larger tires the increase is greater on account of the greater rigidity of the cover walls, resulting in greater internal strains in the fabric at the points of bending.

Initial Pressure in Tire, Cold	Working Pressure in Tire, Warm	Increase Resulting from Work
Lbs. per Sq. In.	*Lbs. per Sq. In.*	*Lbs. per Sq. In.*
71.116	88.183	17.067
85.339	105.750	20.411
99.562	123.546	23.984
113.785	141.920	28.135
128.008	158.588	30.580
142.232	176.368	34.136

CAUSES OF PNEUMATIC TIRE TROUBLES

The following tables were prepared by one of the largest tire makers as a result of investigations in several thousand repair jobs:

SHOES

17.3 per cent. in consequence of insufficient inflation.
3.5 per cent. in consequence of rusty and dented rims.
1.5 per cent. in consequence of cutting off of cover pad through inadequate fastening of butterfly screw, whereby the cover could shift on the rim.
.8 per cent. in consequence of sudden braking, which scoured through tire at one place
.2 per cent. in consequence of contact with oil or other fatty substances, which are known to decompose rubber.
29.4 per cent. in consequence of perforation by nails, stones and pieces of iron.
4.3 per cent. in consequence of light damages and cuts on the threads, easily repaired.
4.9 per cent. in consequence of considerable outer damages, whereby the upper canvas layers were destroyed.
37.1 per cent. in consequence of normal wear and tear.

100.0

TUBES

13.0 per cent. nipped in mounting.
7.2 per cent. places scoured through in consequence of defective mounting or the presence of sand and small stones in tire.
9.5 per cent. through defective mounting.
6.8 per cent. through riding on deflated tubes.
5.8 per cent. damages through defective and wrong cover holders.
10.0 per cent. valve defects through wrong manipulation of valve.
43.7 per cent. normal wear and tear.

100.0

Index to Tables and Data appears on Pages 27 to 30.

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MILEAGE OF PNEUMATIC TIRES

The accompanying tabulated statement of tire mileage is the result of an extensive investigation made by W. A. Weygandt of Akron, Ohio. The table covers 144¾ sets of tires of ten leading makes, in use in every part of the United States on thirty different makes of touring cars. The general average of mileage per set is 5199¾. (The usual tire guarantee is 3500 miles.) The average of casings replaced for any and all causes is three-fourths of one to each set of tires used. The average life of an inner tube is found to be 3543.3 miles.

TIRE MILEAGE RESULTS OBTAINED BY AUTOMOBILE OWNERS

Make of tire	A	B	C	D	E	F	G	H	I	J
Sets reported	41¼	43	13	12¼	8	7	6	7	4	3
Grand total, mileage	256,539	239,975	70,300	65,798	34,100	21,594	20,236	20,200	14,000	8,450
Grand average, mileage	6,221	5,580	5,361	5,371	4,262	3,084	3,372	2,825	3,500	2,816
Grand total, time in use, months	339½	404½	122½	82	93½	61½	37	46½	26	12½
Grand total, extra casings used	23	34	6	6	9	6	9	3	5	1
Grand total, extra tubes used	54	73	24	10	9	17	7	9	5	4
Average period of use, months	8¼	9.3	9⅖	6.7	11.7	8⅘	6⅙	6⅜	6½	4⅙
Average monthly mileage	755.9	593¼	573⅘	802⅜	364.7	351.1	546.9	436½	538⅜	676

AUTOMOBILE SPRING CONSTRUCTION

A formula for determining the safe loading of semi-elliptic leaf springs for automobiles is as follows:

Let,

B = Width of plate in inches.
T = Thickness of plates in 1-16 inches.
N = Number of plates used.
S = Span of spring in inches.
C = A constant = 11.3.

Then,

$$\text{Safe load in tons} = \frac{B\,T^2\,N}{C\,S}$$

To find the amount of deflection in inches per ton of load: Let,

D = Deflection in inches per ton of load.
L = Span of spring in inches.
C = Constant—40,000.
B = Width of plates in inches.

Then,

$$D = \frac{L^3}{CBT^3N}$$

Index to Tables and Data appears on Pages 27 to 30.

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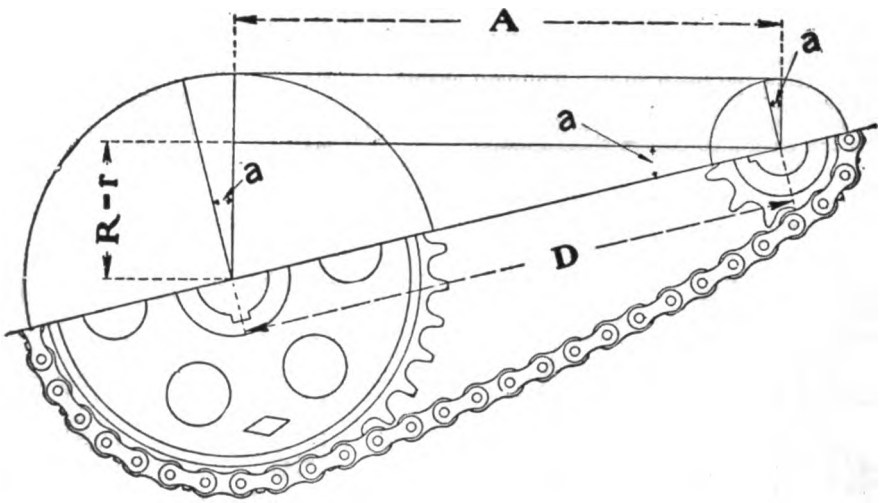
FORMULA FOR CALCULATING LENGTH OF CHAIN

(DIAMOND CHAIN AND MFG. CO.)



(All Dimensions in Inches)

D = Distance between centers.
A = Distance between limits of contact.
R = Pitch radius of large sprocket.
r = Pitch radius of small sprocket.
N = No. of teeth on large sprocket.
n = No. of teeth on small sprocket.
P = Pitch of chain and sprockets.
P = Pitch of chain and sprockets. (Distance from center to center of chain pins.)
$180° + 2a$ = Angle of contact—large sprocket.
$180° - 2a$ = Angle of contact—small sprocket.

$$\sin a = \frac{R - r}{D}$$

$$A = D \cos a$$

Length of chain $= L$

$$L = \frac{(90 + a)\,N\,P}{180} + \frac{(90 - a)\,n\,P}{180} + 2A$$

Index to Tables and Data appears on Pages 27 to 30.

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FORMULA FOR DETERMINING DIAMETERS OF SPROCKETS FOR ROLLER CHAINS (WHITNEY MFG. CO.)

N = Number of teeth in sprocket.
P = Pitch of chain.
D = Diameter of roller.

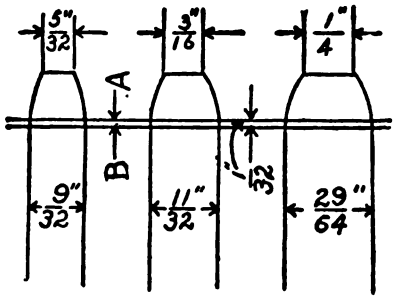
$$a = \frac{180^\circ}{N}$$

$$\text{Pitch Diameter} = \frac{P}{\text{sine } a}$$

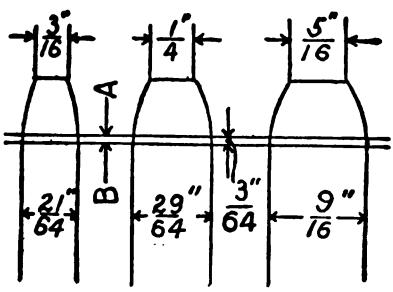
Outside Diameter = Pitch Diameter + D.
Bottom Diameter = Pitch Diameter − D.

The accompanying drawings show width and shape of sprocket blanks as they should be machined before cutting the teeth to fit (Whitney) chains.

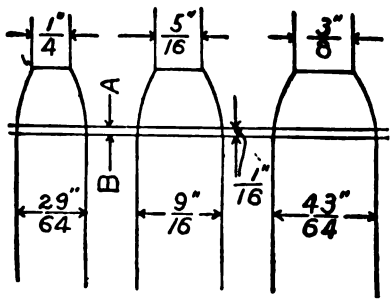
The line "A" indicates pitch line and the line "B" below the pitch line indicates the point at which the clearance curves should start.



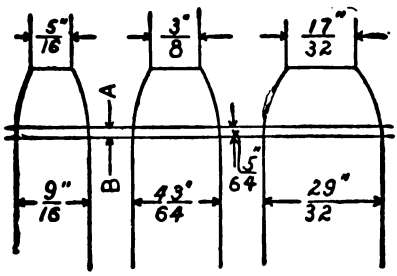
	Pitch of Chain	
¾"	¾"	¾"
	Diameter of Roll	
15/32"	15/32"	15/32"
	Width of Roll	
5/16"	⅜"	⅜"



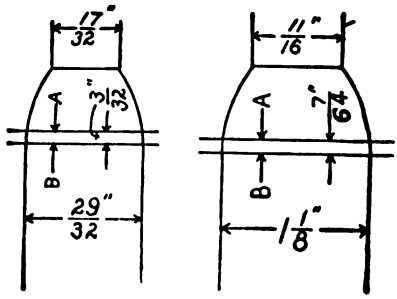
	Pitch of Chain	
1"	1"	1"
	Diameter of Roll	
⅝"	⅝"	⅝"
	Width of Roll	
⅜"	½"	⅝"



	Pitch of Chain	
1¼"	1¼"	1¼"
	Diameter of Roll	
¾"	¾"	¾"
	Width of Roll	
½"	⅝"	¾"



	Pitch of Chain	
1½"	1½"	1½"
	Diameter of Roll	
⅞"	⅞"	⅞"
	Width of Roll	
⅝"	¾"	1"



	Pitch of Chain	
1¾"		2"
	Diameter of Roll	
1"		1⅛"
	Width of Roll	
1"		1⅛"

Index to Tables and Data appears on Pages 27 to 30.

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ANTI-FREEZING SOLUTIONS FOR MOTOR COOLING SYSTEMS

Saline solutions and mixtures of alcohol and water are the most commonly used to prevent freezing up of the cooling system in water-cooled motor vehicles when operated in low winter temperatures. Of the former, that in best repute is a solution of calcium chloride. Crystallized calcium chloride contains about 50 per cent. water of crystallization and dissolves in half its weight of cold water; consequently 8 pounds of calcium chloride dissolved in ½ gallon of water will make 1 gallon of saturated solution. The accompanying table (Fig. 1) shows the percentages of calcium chloride and corresponding specific gravity required to prevent freezing at temperature ranges from freezing point to −40 degrees Fahrenheit. In the use of this solution its thermal capacity, which is lower than water, should be borne in mind.

Taking the specific heat of water as 1.000, the specific heat of a 20 per cent. solution of calcium chloride is 0.834.

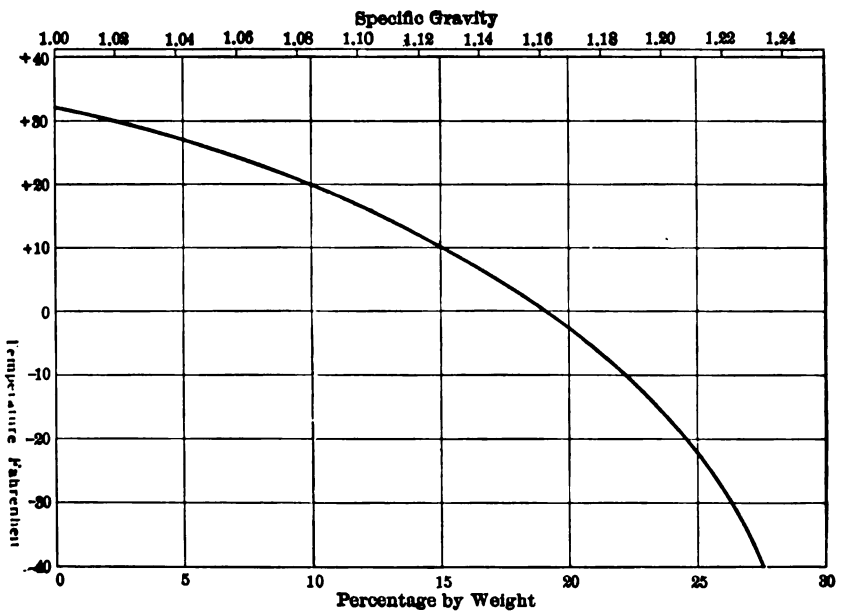

FIG. 1.—Diagram of Freezing Points of Various Solutions of Calcium Chloride in Water.

Mixtures of alcohol and water may be made with either wood alcohol or denatured alcohol. The latter is simply ordinary spirits distilled from grain with an admixture of certain substances that render it unfit for drinking and which may be disregarded in its consideration as a cooling medium. In the accompanying table (Fig. 2) the respective anti-freezing values for wood alcohol and denatured alcohol are given in terms of percentages of the liquid used in the motor-cooling system. These values cover a temperature range from freezing point to −50 degrees Fahrenheit. The specific gravity readings are also included. It will be noted that wood alcohol gives the best results, although objection is frequently made to its use on account of its unpleasant odor.

(Continued on page 636)

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In the use of this mixture the constant tendency of the alcohol to evaporate out and the consequent raising of the freezing point of the mixture should be borne in mind. At any time after the filling of the cooling system with the mixture, a sample can be drawn off and its specific gravity determined by the use of the hydrometer. If the reading is too high, sufficient alcohol can be added to make up for loss by evaporation, taking care, of course, that the amount of water in the system has not been diminished by steaming.

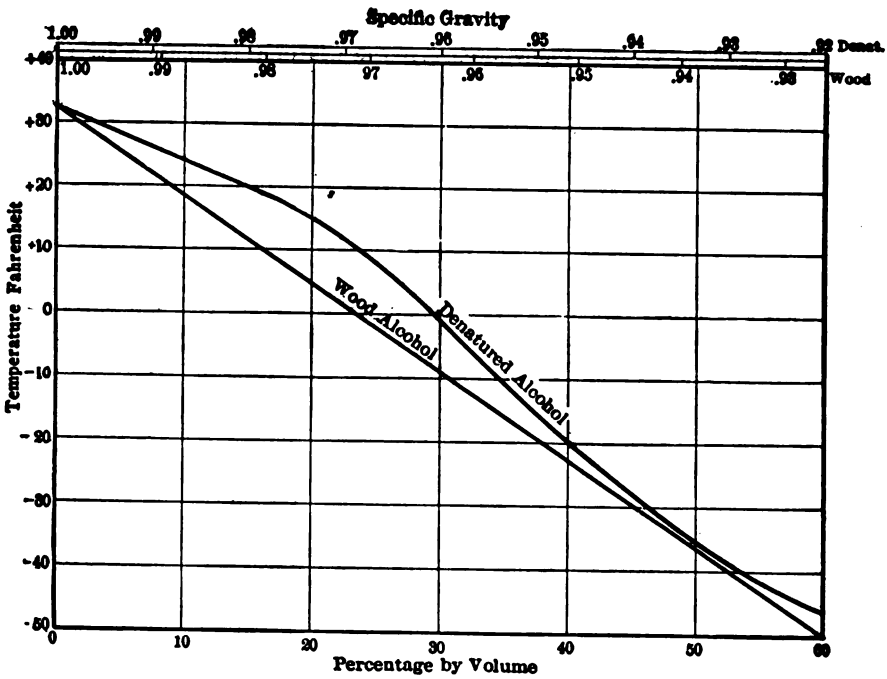

FIG. 2.—Diagram Showing Freezing Temperatures of Mixtures of Alcohol and Water.

STEEL BALLS. "STANDARD" SIZE AND WEIGHTS

Size	Decimal	No. per Pound	Size	Decimal	Ounces
1/16"	.0625	27,904	13/16"	.8125	1 1/2
3/32"	.0937	8,264	7/8"	.8750	1 3/4
1/8"	.1250	3,400	15/16"	.9375	2
5/32"	.1563	1,770	1"	1.000	2 1/2
3/16"	.1875	1,030	1 1/8"	1.125	3 1/2
7/32"	.2188	640	1 1/4"	1.250	4 3/4
1/4"	.2500	430	1 3/8"	1.375	6 1/4
9/32"	.2613	300	1 1/2"	1.500	8
5/16"	.3125	220	1 5/8"	1.625	10
11/32"	.2438	165	1 3/4"	1.750	13
3/8"	.3750	125	1 7/8"	1.875	15 1/2
7/16"	.4375	80	2"	2.000	19 1/4
1/2"	.5000	52	2 1/4"	2.250	27
9/16"	.5625	36	2 1/2"	2.500	37
5/8"	.6250	28	2 3/4"	2.750	49
11/16"	.6875	21	3"	3.000	64
3/4"	.7500	16	3 1/4"	3.250	81 1/2
			3 1/2"	3.500	101 1/2
			3 3/4"	3.750	125
			4"	4.000	152

Index to Tables and Data appears on Pages 27 to 30.

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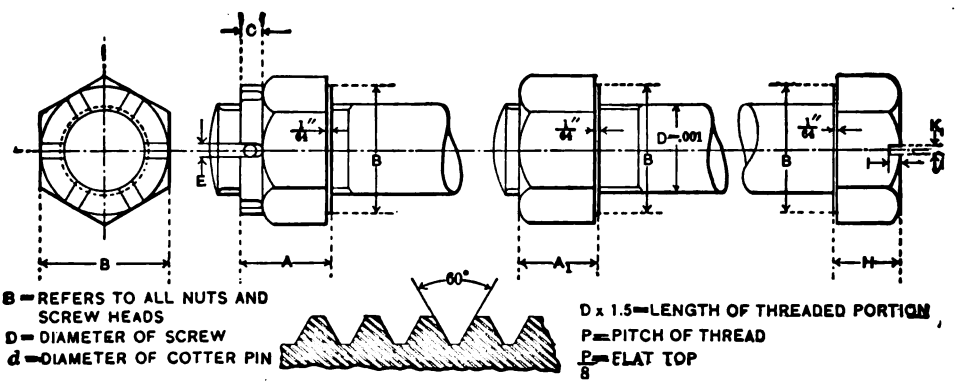
SOCIETY OF AUTOMOBILE ENGINEERS' STANDARD FOR HEXAGON HEAD SCREWS, CASTLE AND PLAIN NUTS.

It is assumed that where screws are to be used in soft material, such as cast-iron, brass, bronze or aluminum, the existing United States standard pitches will be used.

DIMENSIONS



D	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
P	28	24	24	20	20	18	18	16	16	14	14	12	12	12	12
A	9/32	21/64	13/32	29/64	9/16	39/64	23/32	49/64	13/16	29/32	1	15/32	1 1/4	1 13/32	1 1/2
A1	7/32	17/64	21/64	3/8	7/16	31/64	35/64	19/32	21/32	49/64	7/8	63/64	1 3/32	1 13/64	1 5/16
B	7/16	1/2	9/16	5/8	3/4	7/8	15/16	1	1 1/16	1 1/4	1 7/16	1 5/8	1 13/16	2	2 3/16
C	3/32	3/32	1/8	1/8	3/16	3/16	1/4	1/4	1/4	1/4	1/4	5/16	5/16	3/8	3/8
E	5/64	5/64	1/8	1/8	1/8	5/32	5/32	5/32	5/32	5/32	5/32	7/32	7/32	1/4	1/4
H	3/16	15/64	9/32	21/64	3/8	27/64	15/32	33/64	9/16	21/32	3/4	27/32	15/16	1 1/32	1 1/8
I	3/32	7/64	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	7/32	7/32	1/4	1/4
K	1/16	1/16	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	5/32	5/32	3/16	3/16
d	1/16	1/16	3/32	3/32	3/32	1/8	1/8	1/8	1/8	1/8	1/8	11/64	11/64	13/64	13/64

Index to Tables and Data appears on Pages 27 to 30.

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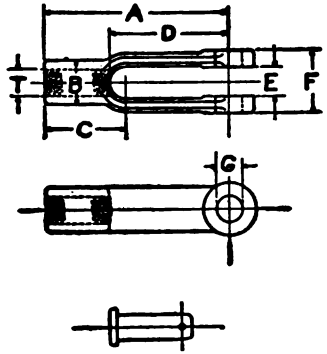
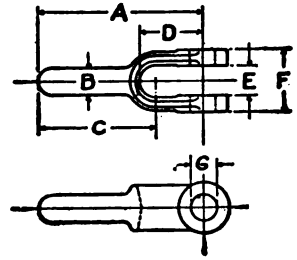
S. A. E. YOKE AND EYE ROD END STANDARD.

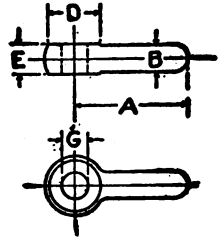
Adjustable Yoke Ends



Plain Yoke Ends



Rod Ends



A	B	C	D	E	F	G	T
1 9/16	5/16	11/16	1	3/16	7/16	3/16	3/16 32 U. S.
2	7/16	7/8	1 1/4	9/32	5/8	1/4	1/4 28 A.L.A.M.
2 1/4	1/2	1	1 7/16	11/32	3/4	5/16	5/16 24 A.L.A.M.
2 1/2	5/8	1 1/8	1 5/8	7/16	7/8	3/8	3/8 24 A.L.A.M.
2 7/8	23/32	1 1/4	1 7/8	1/2	1	7/16	7/16 20 A.L.A.M.
3	15/16	1 7/16	1 7/8	9/16	1 1/8	1/2	1/2 20 A.L.A.M.

A	B	C	D	E	F	G
1 1/4	3/16	7/8	7/16	3/16	7/16	3/16
1 3/4	1/4	1 1/4	5/8	9/32	5/8	1/4
2	5/16	1 3/8	3/4	11/32	3/4	5/16
2 1/8	3/8	1 7/16	27/32	7/16	7/8	3/8
2 1/4	7/16	1 1/2	1	1/2	1	7/16
2 1/2	1/2	1 5/8	1 1/8	9/16	1 1/8	1/2

A	B	D	E	G
1 1/4	3/16	3/8	3/16	3/16
1 1/4	1/4	1/2	9/32	1/4
1 3/8	5/16	19/32	11/32	5/16
1 1/2	3/8	11/16	7/16	3/8
1 1/2	7/16	13/16	1/2	7/16
1 3/4	1/2	15/16	9/16	1/2

Index to Tables and Data appears on Pages 27 to 30.

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INTERNATIONAL (METRIC SYSTEM) STANDARD 60° THREAD

Diameter of Screw	Pitch	Diameter at Root of Thread	Width of Flat at Top and Bottom of Thread
Millimetres	*Millimetres*	*Millimetres*	*Millimetres*
3	.5	2.35	.06
4	.75	3.03	.09
5	.75	4.03	.09
6	1.0	4.70	.13
7	1.0	5.70	.13
8	1.0	6.70	.13
8	1.25	6.38	.16
9	1.0	7.70	.13
9	1.25	7.38	.16
10	1.5	8.05	.19
11	1.5	9.05	.19
12	1.5	10.05	.19
12	1.75	9.73	.22
14	2.0	11.40	.25
16	2.0	13.40	.25
18	2.5	14.75	.31
20	2.5	16.75	.31
22	2.5	18.75	.31
22	3.0	18.10	.38
24	3.0	20.10	.38
26	3.0	22.10	.38
27	3.0	23.10	.38
28	3.0	24.10	.38
30	3.5	25.45	.44
32	3.5	27.45	.44
33	3.5	28.45	.44
34	3.5	29.45	.44
36	4.0	30.80	.5
38	4.0	32.80	.5
39	4.0	33.80	.5
40	4.0	34.80	.5
42	4.5	36.15	.56
44	4.5	38.15	.56
45	4.5	39.15	.56
46	4.5	40.15	.56
48	5.0	41.51	.63
50	5.0	43.51	.62
52	5.0	45.51	.63

NOTE.—This thread is largely used by Italian constructors.

Index to Tables and Data appears on Pages 27 to 30.

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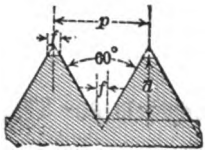
UNITED STATES 60° SCREW THREAD



Formula
$$\begin{cases} p = \text{pitch} = \dfrac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .6495 \\ f = \text{flat} = \dfrac{p}{8} \end{cases}$$

Diameter of Screw	Threads to Inch	Diameter at Root of Thread	Width of Flat
1/4	20	.185	.0063
5/16	18	.2403	.0069
3/8	16	.2936	.0078
7/16	14	.3447	.0089
1/2	13	.4001	.0096
9/16	12	.4542	.0104
5/8	11	.5069	.0114
3/4	10	.6201	.0125
7/8	9	.7307	.0139
1	8	.8376	.0156
1 1/8	7	.9394	.0179
1 1/4	7	1.0644	.0179
1 3/8	6	1.1585	.0208
1 1/2	6	1.2835	.0208
1 5/8	5 1/2	1.3888	.0227
1 3/4	5	1.4902	.0250
1 7/8	5	1.6152	.0250
2	4 1/2	1.7113	.0278
2 1/4	4 1/2	1.9613	.0278
2 1/2	4	2.1752	.0313
2 3/4	4	2.4252	.0313
3	3 1/2	2.6288	.0357
3 1/4	3 1/2	2.8788	.0357
3 1/2	3 1/4	3.1003	.0385
3 3/4	3	3.3170	.0417
4	3	3.5670	.0418
4 1/4	2 7/8	3.7982	.0455
4 1/2	2 3/4	4.0276	.0455
4 3/4	2 5/8	4.2551	.0476
5	2 1/2	4.4804	.0500
5 1/4	2 1/2	4.7304	.0500
5 1/2	2 3/8	4.9530	.0526
5 3/4	2 3/8	5.2030	.0526
6	2 1/4	5.4226	.0556

Standard Proportions for Machine Screws

The report of the committee on standard proportions for machine screws of the American Society of Mechanical Engineers is published in the October, 1906, proceedings of the society. The report is substantially in agreement with the recommendations adopted at the joint meeting held in New York, April 11, 1904.

The committee believes the following combined details to be essential in establishing and maintaining a standard for the diameters, threads and heads of machine screws, including, as it does, diameters, threads and limits for the taps which are to be used in connection therewith: (*a*) form of thread, (*b*) diameters, (*c*) number of threads per inch, (*d*) standard reference thread gauges, basic and for screws and taps, (*e*) working gauges for screws and taps, (*f*) limits of variation, measured in the angle of the thread, (*g*) limits of variation in external diameter, (*h*) limits of variation in the pitch of the thread screws and taps, (*k*) proportions of the heads.

Index to Tables and Data appears on Pages 27 to 30.

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DRILL SIZES FOR STANDARD THREADS

These sizes give an allowance above the bottom of thread on sizes 5/16 to 2; varying respectively as follows: for " V " Threads, .010" to .055"; for U. S. S. and Whitworth threads .005" to .027".

These are found by adding to the size at bottom of thread 1/4 of the pitch for " V " threads, and 1/8 of the pitch for U. S. S. and Whitworth, the pitch being equal to 1" ÷ No. of threads per 1".

In practice it is better to use a larger drill if the exact size called for cannot be had.

Size Screw	No. of Threads	Size of Drill			Size Screw	No. of Threads	Size of Drill		
		U. S. S.	" V "	W.			U. S. S.	" V "	W.
1/4	24	.201	.196	.202	15/16	9	.808	.790	.810
1/4	20	.191	.184	.192	1	8	.854	.832	.856
5/16	18	.248	.239	.249	1 1/16	8	.917	.894	.919
3/8	16	.302	.293	.303	1 1/8	7	.957	.932	.960
7/16	14	.354	.345	.355	1 1/4	7	1.082	1.057	1.085
1/2	13	.409	.399	.410	1 3/8	6	1.179	1.144	1.182
1/2	12	.402	.391	.403	1 1/2	6	1.304	1.269	1.307
9/16	12	.465	.453	.466	1 5/8	5 1/2	1.412	1.372	1.416
5/8	11	.518	.506	.520	1 5/8	5	1.390	1.347	1.394
11/16	11	.581	.568	.583	1 3/4	5	1.515	1.472	1.519
3/4	10	.632	.618	.634	1 7/8	5	1.640	1.597	1.644
13/16	10	.695	.680	.697	1 7/8	4 1/2	1.614	1.566	1.619
7/8	9	.745	.728	.747	2	4 1/2	1.739	1.691	1.744

DRILL SIZES FOR S. A. E. THREADS

Size of Tap	Size of Drill
1/4 inch x 28 threads	7/32 inch
5/16 " x 24 "	17/64 "
3/8 " x 24 "	21/64 "
7/16 " x 20 "	3/8 "
1/2 " x 20 "	7/16 "
9/16 " x 18 "	1/2 "
5/8 " x 18 "	9/16 "
11/16 " x 16 "	39/64 "
3/4 " x 16 "	43/64 "
7/8 " x 14 "	25/32 "
1 " x 14 "	29/32 "
1 1/8 " x 12 "	1 1/64 "
1 1/4 " x 12 "	1 9/64 "
1 3/8 " x 12 "	1 17/64 "
1 1/2 " x 12 "	1 25/64 "

The above tap drills allow a thread within 1/64 in. of full thread.

Index to Tables and Data appears on Pages 27 to 30.

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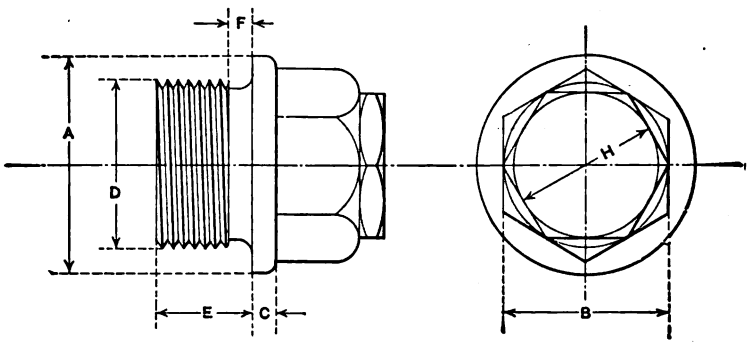
S. A. E. STANDARD SPARK PLUG

The spark plug adopted as a standard has a ⅞-inch diameter, straight thread, 18 pitch, and the design and dimensions shown in the following drawing and specifications:



A—One and one-eighth inch (1⅛″).

B—Seven-eighths inch (⅞″).

C—One-eighth inch (⅛″).

D—Seven-eighths inch (⅞″).

E—Not less than one-half inch (min. ½″).

F—Not more than one-eighth inch (max. ⅛″). (Depth of recess—not over depth of thread).

H—Three-quarters inch (¾″).

SPECIFICATIONS

Stock—1⅛ inch round.
Head Form—Milled Hex.
Short Diameter—⅞ inch.
Flange Form—Circular.
Diameter—1⅛ inch.
Thickness—⅛ inch.
Face—Annular seat ⅛ inch wide. (Suitable for McKim Type Copper-Asbestos Gasket.)
Blank for Thread—Diameter—⅞ inch.
Length—Not less than ½ inch.
Recess Adjacent to Flange—Width—Not over ⅛ incn.
Depth—Not over depth of thread.
Thread Diameter—⅞ inch straight.
Pitch—18.
Form—U. S. Standard.
Cut—Perfect into recess.
Tolerance in third diameter + 0″—.003″.
Packing-Gland Nut Head—Form—Hexagonal.
Short Diameter—¾ inch.

Index to Tables and Data appears on Pages 27 to 30.

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DIMENSIONS OF STANDARD WEIGHT WROUGHT-IRON PIPE

1¼ and smaller proved to 300 pounds per square inch by hydraulic pressure.
1½ and larger proved to 500 pounds per square inch by hydraulic pressure.

Inside diameter.	Actual Outside Diameter.	Thickness.	Actual Inside Diameter.	Inside Circumference.	Outside Circumference.	Length of Pipe per square foot of inside surface.	Length of Pipe per square foot of outside surface.	Inside Area.	Outside Area.	Length of Pipe containing one cubic foot.	Weight per foot.	No. of Threads per inch of screw.	Taper of threads per inch of screw.
Ins.	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ft.*	*Ft.*	*Ins.*	*Ins.*	*Ft.*	*Lbs.*		*In.*
⅛	0.405	0.068	0.270	0.848	1.272	14.15	9.44	0.0572	0.129	2500.	0.243	27	1/32
¼	.54	.088	.364	1.144	1.696	10.50	7.075	.1041	.229	1385.	.422	18	1/32
⅜	.675	.091	.494	1.552	2.121	7.67	5.657	.1916	.358	751.5	.561	18	1/32
½	.84	.109	.623	1.957	2.652	6.13	4.502	.3048	.554	472.4	.845	14	1/32
¾	1.05	.113	.824	2.589	3.299	4.635	3.637	.5333	.866	270.	1.126	14	1/32
1	1.315	.134	1.048	3.292	4.134	3.679	2.903	.8627	1.357	166.9	1.670	11½	1/32
1¼	1.66	.140	1.380	4.335	5.215	2.768	2.301	1.496	2.164	96.25	2.258	11½	1/32
1½	1.90	.145	1.611	5.061	5.969	2.371	2.01	2.038	2.835	70.65	2.694	11½	1/32
2	2.375	.154	2.067	6.494	7.461	1.848	1.611	3.355	4.430	42.36	3.600	11½	1/32
2½	2.875	.204	2.468	7.754	9.032	1.547	1.328	4.783	6.491	30.11	5.773	8	1/32
3	3.50	.217	3.067	9.636	10.996	1.245	1.091	7.388	9.621	19.49	7.547	8	1/32

SIZING AND CUTTING OF GEAR WHEELS

The word "diameter," when applied to gears, is always understood to mean the pitch diameter.

Diametral pitch of the gear is the number of teeth to each inch of its pitch diameter.

If a gear has 40 teeth and the pitch diameter is 4 inches there are ten teeth to each inch of the pitch diameter, and the diametral pitch is 10, or in other words the gear is 10 diametral pitch.

Circular pitch is the distance from the center of one tooth to the center of the next tooth, measured along the pitch circle.

If the distance from the center of one tooth to the center of next tooth, measured along the pitch circle, is ½ inch the gear is ½ inch circular pitch.

The diametral pitch given, to obtain the circular pitch divide 3.1416 by the diametral pitch.

If the diametral pitch is 4 divide 3.1416 by 4, and the quotient, .7854 inch. is the circular pitch.

Index to Tables and Data appears on Pages 27 to 30.

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The circular pitch given, to obtain the diametral pitch divide 3.1416 by the circular pitch.

If the circular pitch is 2 inches, divide 3.1416 by 2, and the quotient 1.5708, is the diametral pitch.

The number of teeth and the diametral pitch given, to obtain the pitch diameter divide the number of teeth by the diametral pitch.

If the number of teeth is 40 and the diametral pitch 4 divide 40 by 4, and the quotient, 10, is the pitch diameter.

The number of teeth and the diametral pitch given, to obtain the whole diameter or size of blank of gear add 2 to the number of teeth and divide by the diametral pitch.

If the number of teeth is 40 and the diametral pitch is 4 add 2 to the 40, making 42, and divide by 4; the quotient, 10½ is the whole diameter of the gear or blank.

The number of teeth and the diameter of the blank given, to obtain the diametral pitch add 2 to the number of teeth and divide by the diameter of the blank.

If the number of teeth is 40, and the diameter of the blank is 10½ inches, add 2 to the number of teeth, making 42, and divide by 10½; the quotient, 4, is the diametral pitch.

The pitch diameter and the diametral pitch given, to obtain the number of teeth multiply the pitch diameter by the diametral pitch.

If the diameter of the pitch circle is 10 inches and the diametral pitch is 4 multiply 10 by 4, and the product, 40, will be the number of teeth in the gear.

The whole diameter of the blank and the diametral pitch given, to obtain the number of teeth in the gear multiply the diameter by the diametral pitch and subtract 2.

If the whole diameter is 10½ and the diametral pitch is 4 multiply 10½ by 4 and the product, 42 less 2, or 40, is the number of teeth.

The thickness of a tooth at the pitch line is found by dividing the circular pitch by 2, or divide 1.57 by the diametral pitch.

If the circular pitch is 1.047 inches, or the diametral pitch is 3, divide 1.047 by 2 or 1.57 by 3, and the quotient, .523 inch, is the thickness of the tooth.

The whole depth of a tooth is found by dividing 2.157 by the diametral pitch.

If the diametral pitch of a gear is 6, the whole depth is 2.157 divided by 6, equals .3595.

The whole depth of a tooth is about 11-16, or exactly .6866 of the circular pitch.

If the circular pitch is 2 the whole depth of tooth is about 11-16 of 2 inches, or 1⅜ inches nearly.

The distance between the centers of two gears is found by adding the number of teeth together and dividing half the sum by the diametral pitch.

If two gears have 50 and 30 teeth, respectively, and are 5 pitch, add 50 and 30, making 80, divide by 2, and then divide the quotient, 40, by the diametral pitch, 5, and the result, 8 inches, is the center distance.

Index to Tables and Data appears on Pages 27 to 30.

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NATIONAL AUTOMOBILE AND ALLIED ORGANIZATIONS

AUTOMOBILE CHAMBER OF COMMERCE, Inc.

7 East 42d St., New York, N. Y.

Objects: To foster the interests of those engaged in the trade or business of manufacturing automobiles and all other self-propelling vehicles.

To reform abuses relative thereto.

To secure freedom of its members from unjust or unlawful exactions.

To diffuse accurate and reliable information as to the standing of merchants and others dealing with members, as to all inventions, patents, processes or devices designed or intended for use in, upon, or in connection with such vehicles and the manufacture thereof, as to the state of the art relative thereto, and as to the condition and development of the trade in which the members are engaged, in the United States and foreign countries.

To procure uniformity and certainty in the customs and usages of such trade.

To promote the construction of better highways.

To advocate the enactment of just and equitable laws affecting members.

To settle differences between members.

To promote a more enlarged and friendly intercourse among business men engaged in such trade or dealing with persons engaged therein.

To acquire by grant, gift, purchase, device or bequest, to hold and to dispose of such property as the purposes of the corporation shall require, subject to such limitations as may be prescribed by law, including inventions, letters patent and processes, or rights thereunder, for the benefit of its members and not for pecuniary profit.

Officers

President, Charles Clifton
Vice-President, Wilfred C. Leland
Secretary, R. D. Chapin
Treasurer, George Pope
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297 Madison Ave., New York, N. Y.

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Treasurer, Arthur Johns
Secretary, Howard Huntington

Index to Tables and Data appears on Pages 27 to 30.

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1790 Broadway, New York, N. Y.

Object: To promote the arts and sciences connected with engineering and mechanical construction of automobile vehicles.

Officers

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80 Wall St., New York, N. Y.

Object: To protect members against irresponsible debtors; collect and disseminate credit information

Officers

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Secretary and Treasurer, Franz Neilson, 80 Wall St., New York, N. Y.

MOTOR AND ACCESSORY MANUFACTURERS

17 West 42d St., New York, N. Y.

Objects: To promote in all lawful ways the interests of makers of motors, motor parts, and accessories
To aid in the protection of its members.
To secure the advantages to be obtained by mutual co-operation.
To facilitate the collection of the claims of its members and the diffusion of information concerning trade dealers, credits, and other matters of interest to the members of the Association.
To co-operate with similar associations in other states.

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Third Vice-President, F. C. Billings	Manager, W. M. Sweet

THE ELECTRIC VEHICLE ASSOCIATION OF AMERICA

29 W. 39th St., New York, N. Y.

Object: The object of this Association shall be to promote the adoption and use of electric vehicles for business and pleasure purposes.

Officers

President, Frank W. Smith, United Electric Light & Power Co., 130 E. 15th St., New York, N. Y.
Vice-President, John F. Gilchrist, Commonwealth Edison Co., 120 W. Adams St., Chicago, Ill.
Secretary, Harvey Robinson, New York Edison Company, Irving Pl. and 15th St., New York, N. Y.
Treasurer, Day Baker, General Vehicle Co., 84 State St., Boston, Mass.
Executive Secretary, A. Jackson Marshall, 29 W. 39th St., New York, N. Y.

Index to Tables and Data appears on Pages 27 to 30.

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AMERICAN AUTOMOBILE ASSOCIATION

437 Fifth Ave., New York, N. Y.

Objects: To unite in one body all the automobile clubs and individual motorists of the country to secure reasonable and just legislation.

To aid in proper enforcement of automobile laws and ordinances; to advocate and obtain local, State and Federal aid in the construction and maintenance of good roads.

To encourage touring, and to secure, prepare, and disseminate information relative thereto; and

To support sportsmanlike contests and other movements that will advance motoring interests.

Officers

President, John A. Wilson, Pennsylvania Motor Federation
First Vice-President, H. M. Rowe, Automobile Club of Maryland
Second Vice-President, Ralph W. Smith, Colorado State Automobile Association
Third Vice-President, F. L. Baker, Automobile Club of Southern California
Fourth Vice-President, H. J. Clark, Minnesota State Automobile Association
Fifth Vice-President, Preston Belvin, Virginia State Automobile Association.
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Touring Information Board, Frank X. Mudd, 437 Fifth Ave., New York, N. Y.

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FEDERATION OF AMERICAN MOTORCYCLISTS

Box 947, Westboro, Mass.

Objects: To encourage the use of motorcycles and to promote the general interests of motorcycling.
To ascertain, defend and protect the rights of motorcyclists.
To facilitate touring.
To assist in the good-roads movement.
To govern and administer the sport of motorcycle racing and other competitions in which motorcycles engage.

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Secretary-Treasurer, G. B. Gibson, Box 947, Westboro, Mass.
Chairman of Competition Committee, Wm. M. Johnson, 818 Ashland Blk., Chicago, Ill.
Chairman of Legal Action Committee, O. F. McLain, 18 W. Market St., Indianapolis, Ind.
Chairman of Membership Committee, Guernsey Van Riper, 920 Hume-Mansur Bldg., Indianapolis, Ind.

NATIONAL ASSOCIATION OF ENGINE AND BOAT MANUFACTURERS (Inc.)

29 West 39th St., New York, N. Y.

Object: To protect, promote, further and advance the interests of the members, as manufacturers and dealers of engines, motors and boats of every kind and description and accessories thereto, and as journalists devoted in all or in part to the interests of engines, motors and boats and allied and kindred industries.

Officers

President, John J. Amory
First Vice-President, Henry R. Sutphen
Second Vice-President, W. H. Mullins
Third Vice-President, C. A. Criqui
Treasurer, James Craig
Secretary, Ira Hand

NATIONAL GAS ENGINE ASSOCIATION

Lakemont, N. Y.

Object: To promote, further and advance the interests of the trade, also to hold a national convention once a year of the interested parties, the purpose of such convention to be for the promoting of education and sociability among the members of the Association.

Officers

President, R. A. Oglesby, South Bend, Ind.
First Vice-President, H. D. Lauson, New Holstein, Wis.
Treasurer, Otto M. Knoblock, South Bend, Ind.
Secretary, H. R. Brate, Lakemont, N. Y.

Index to Tables and Data appears on Pages 27 to 30.

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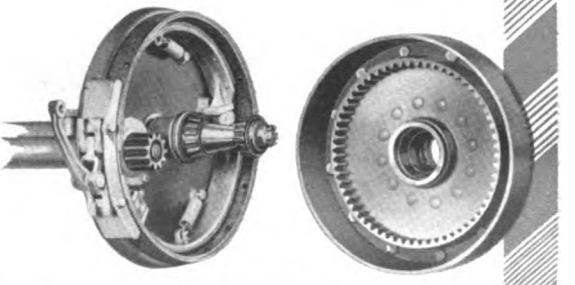
Russel

Internal Gear Drive Axle for One Ton Truck

FOR over a year our Engineering Department has concentrated its entire attention on the development of the one-ton truck axle. Our investigations and tests have shown us the strength and weakness of the various rear drive systems now in use. The logical result has been the development of the one-ton axle announced herein. We believe it represents the most serviceable compromise between the conflicting demands of durability, efficiency, quietness, simplicity, neatness and cost.

RUSSEL MOTOR AXLE COMPANY
North Detroit
Michigan



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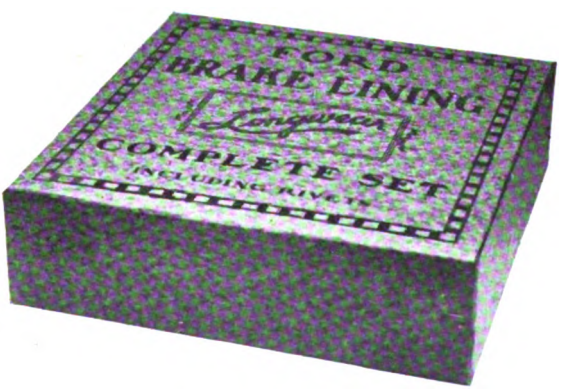
Won't get Hard. Will never "squeak." Made of Pure Asbestos Threads in which are embedded fine brass wires, the threads being then woven into a solid mass by a patented process, then thoroughly impregnated with a compound that renders the finished article absolutely waterproof, dustproof, grease, oil and mudproof, yet leaves it sufficiently pliable to act quickly at all times.



ASBESTOS AUTOMOBILE BRAKE BAND LINING
and CLUTCH FACINGS.
FLANGE GASKETS,
MANHOLE AND HANDHOLE GASKETS,
PISTON AND SHEET PACKINGS.

Manufactured by

Asbestos & Rubber Works of New Jersey

Mills and Office: CAMDEN, NEW JERSEY

JOHN H. SCUDDER, Pres. JOS. A. WHITNEY, Sec. JOHN M. SCUDDER, Treas.

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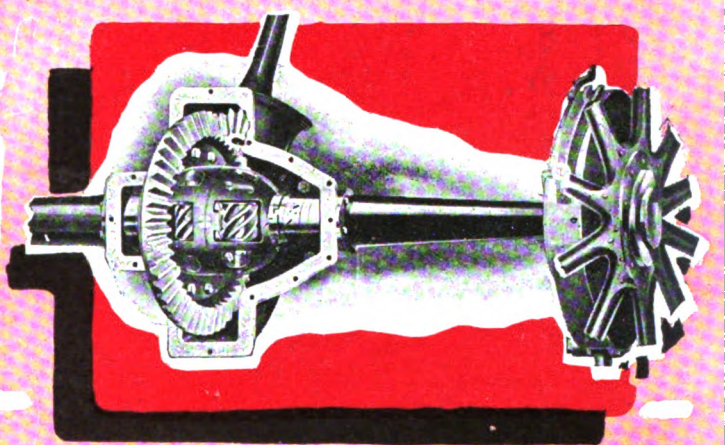
M&S Differential



There Are 10 Surprisingly Sound Reasons Why You Should Install the M. & S. Differential Into Your Car. Read Them:—

First:—Adapted to any make of car without change in rear axle system.
Second:—Power equalized on both wheels when car is turning.
Third:—Increased efficiency of the motor of your car.
Fourth:—Less wear on rear set of tires.
Fifth:—Even running of car by reason of power applied evenly to both wheels.
Sixth:—Greater mileage to each gallon of gasoline used.
Seventh:—Impossible for one wheel to skid or spin in mud-holes or sand, when other rear wheel has traction.
Eighth:—Will eliminate 75% of the use of chains and prevent skidding on wet streets.
Ninth:—Same motor plant will pull more load than with ordinary differential.
Tenth:—A positive pull on two wheels.

Let us give you more complete information.

THE M. & S. GEAR COMPANY

1528 Grand Avenue — Kansas City, Missouri

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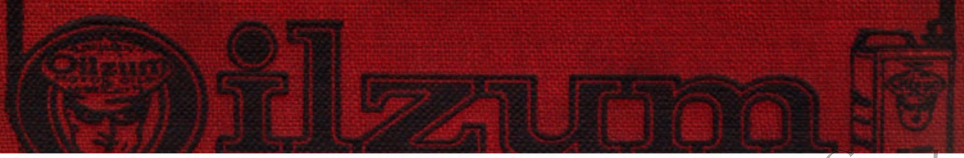

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